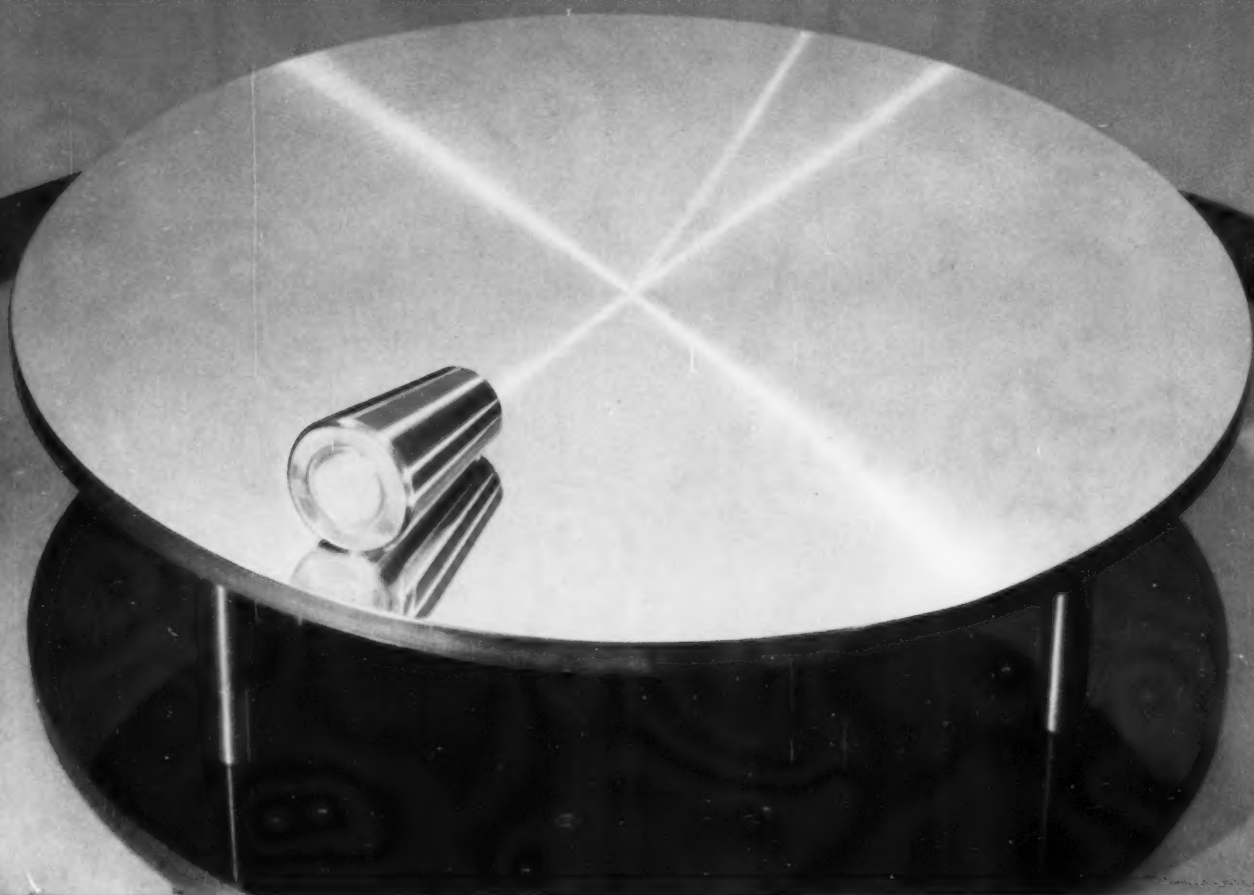


NOVEMBER, 1957 SIXTY-FOURTH YEAR

# ***Machinery***



**See this demonstration on Network TV  
November 21st**

This is a roller from a Timken® tapered roller bearing. On this oscillating table it will roll forever in the same true path, demonstrating the precision of a Timken roller bearing. Millions of people will see this demonstration on the next Timken Televent hour over 173 NBC-TV stations November 21. 10:00 to 11:00 p.m. EST.



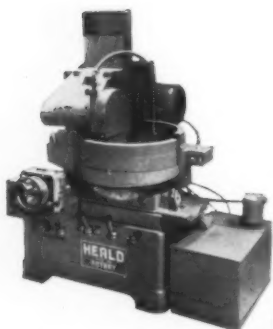
*This symbol on a product means  
its bearings are the best*

**TIMKEN TAPERED ROLLER BEARINGS ROLL THE LOAD**



**Large work? Low RMS finish?**

**Here's a shining example.**



***The 30" Heald Model 361 Rotary  
does an outstanding surface grinding job***

Take this case for instance. The column-type rotary Model 361-30" is designed to precision surface grind relatively large work. The wheel grinds on its periphery, producing a concentric finish highly desirable in certain applications. The 361 is now available with either a 24" or 30" magnetic chuck, and can easily handle work of the size shown above. This piece has a 2-4 R.M.S. finish and a flatness of .0001 in 30". Send for Bulletin 2-361-1.

***IT PAYS TO COME  
TO HEALD!***



**THE HEALD MACHINE COMPANY**

Subsidiary of The Cincinnati Milling Machine Co.

**Worcester 6, Massachusetts**

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



CHARLES O. HERB

Editor

CHARLES H. WICK

Managing Editor

FREEMAN C. DUSTON

EDGAR ALTHOLZ

RAYMOND H. SPIOTTA

Associate Editors

HAROLD W. BREDIN

Assistant Editor

PAUL B. SCHUBERT

Materials Editor

HENRY H. RYFFEL

Shop Mathematics Editor

Published monthly by

THE INDUSTRIAL PRESS

ROBERT B. LUCHARS

President

EDGAR A. BECKER

Vice-President and Treasurer

HAROLD L. GRAY

Secretary and Publishing Manager

Editorial, Advertising, and  
Circulation Offices:

93 Worth St., New York 13, N. Y.  
Telephone, CAnal 6-8120

Advertising Representatives

WALTER E. ROBINSON

DWIGHT COOK

93 Worth St., New York 13, N. Y.

GEORGE H. BUEHLER

228 N. LaSalle St., Chicago 1, Ill.

NORMAN O. WYNKOOP, Jr.

15937 W. Seven Mile Road, Detroit 35, Mich.

DON HARWAY & CO.

1709 W. Eighth St., Los Angeles 17, Calif.

RICHARD E. HOIERMAN

9006 Capri Drive, Dallas 18, Tex.

FRED W. SMITH

1201 Forest View Lane, Birmingham 9, Ala.

Subscription rates: United States and Canada,  
one year, \$4; two years, \$7; three years, \$8;  
foreign countries, one year, \$7; two years,  
\$13. Single copies, 50 cents. Changes in ad-  
dress must be received by the tenth of the  
month to be effective for the next issue. Send  
old as well as new address. Copyright 1957  
by The Industrial Press.

Entered as second-class mail matter May 25,  
1953, at the Post Office at Bristol, Conn.,  
under the Act of March 3, 1879. Printed by  
Hildreth Press, Inc., Bristol, Conn., U.S.A.

British Address:

MACHINERY

National House, West St.  
Brighton 1, England

French Address:

LA MACHINE MODERNE

15, Rue Bleue  
Paris-IX\*, France



# Machinery

NOVEMBER 1957

VOL. 64 NO. 3

THE MONTHLY MAGAZINE OF ENGINEERING AND PRODUCTION  
IN THE MANUFACTURE OF METAL PRODUCTS

## SHOP PRACTICE

|  |                    |     |
|--|--------------------|-----|
| Getting More From Your Portable Air Tools .....  | Hugh L. Whitehouse | 141 |
| A New Idea in Spark-Machining .....  | James D. Shoemaker | 147 |
| Producing Dryer Components at Hotpoint .....   | Herbert Chase      | 151 |
| Heavy-Duty Bending is a Familiar Sight at Caterpillar Plant ..                         | A. W. Johnson      | 158 |
| Aluminum Soldered Ultrasonically .....   | Leo Walter         | 160 |
| Paint Thickness ... A Critical Airplane Dimension .....                                | Norman Keegan      | 161 |
| Piercing Introduced in Roll-Milling Line .....   |                    | 162 |
| Producing Hose Reel Nuts on an Automatic Bar Machine .....                             |                    | 166 |
| Carbide Tooling and Single-Purpose Lathes Speed Machining of Forged<br>Crankpins ..... |                    | 173 |

## MACHINE AND TOOL DESIGN

|   |                   |     |
|---|-------------------|-----|
| Two-Way Clamping and Automatic Work-Centering Fixtures ...    | W. M. Halliday    | 154 |
| Design of Relieved Locator Pins .....                         | F. Murray         | 164 |
| Tables Facilitate Lathe Winding of Conical Coil Springs ..... | George Herzl      | 172 |
| Prizes Awarded in Ingenious Mechanisms Competition .....      |                   | 177 |
| Jaw Thread Sections Formed on Lathe .....                     | Jose C. Sobkowiak | 197 |
| Air Indexing Fixture .....                                    | G. F. Groschke    | 198 |
| Retracting Stock Stop with Renewable Slide .....              | Frank L. Rush     | 199 |
| Properties of Aluminum Alloys (Data Sheets) .....             |                   | 233 |

## REFERENCE SECTION

|                                     |                    |     |
|-------------------------------------|--------------------|-----|
| Thread Rolling May Be for You ..... | Raymond H. Spiotta | 181 |
|-------------------------------------|--------------------|-----|

## MANAGEMENT PROBLEMS AND EVENTS

|  |                 |     |
|--|-----------------|-----|
| Well Done, WOC's .....   | Charles O. Herb | 139 |
| Confidence and Service Stressed by Machine Tool Distributors ..... |                 | 178 |
| Cincinnati Milling Holds Technical Activities Seminar .....        |                 | 180 |
| What Did that Meeting Accomplish? .....                            | Bernard Lester  | 196 |

## DEPARTMENTS

|                                   |     |                                       |     |
|-----------------------------------|-----|---------------------------------------|-----|
| KEEPING UP WITH WASHINGTON .....  | 137 | LATEST DEVELOPMENTS IN SHOP EQUIPMENT | 200 |
| MATERIALS .....                   | 167 | NEW CATALOGUES .....                  | 221 |
| IN SHOPS AROUND THE COUNTRY ..... | 170 | DATA SHEET .....                      | 233 |
| TALKING WITH SALES MANAGERS ..... | 196 | BETWEEN GRINDS .....                  | 248 |
| TOOL ENGINEERING IDEAS .....      | 197 | NEWS OF THE INDUSTRY .....            | 250 |
| COMING EVENTS .....               | 258 |                                       |     |

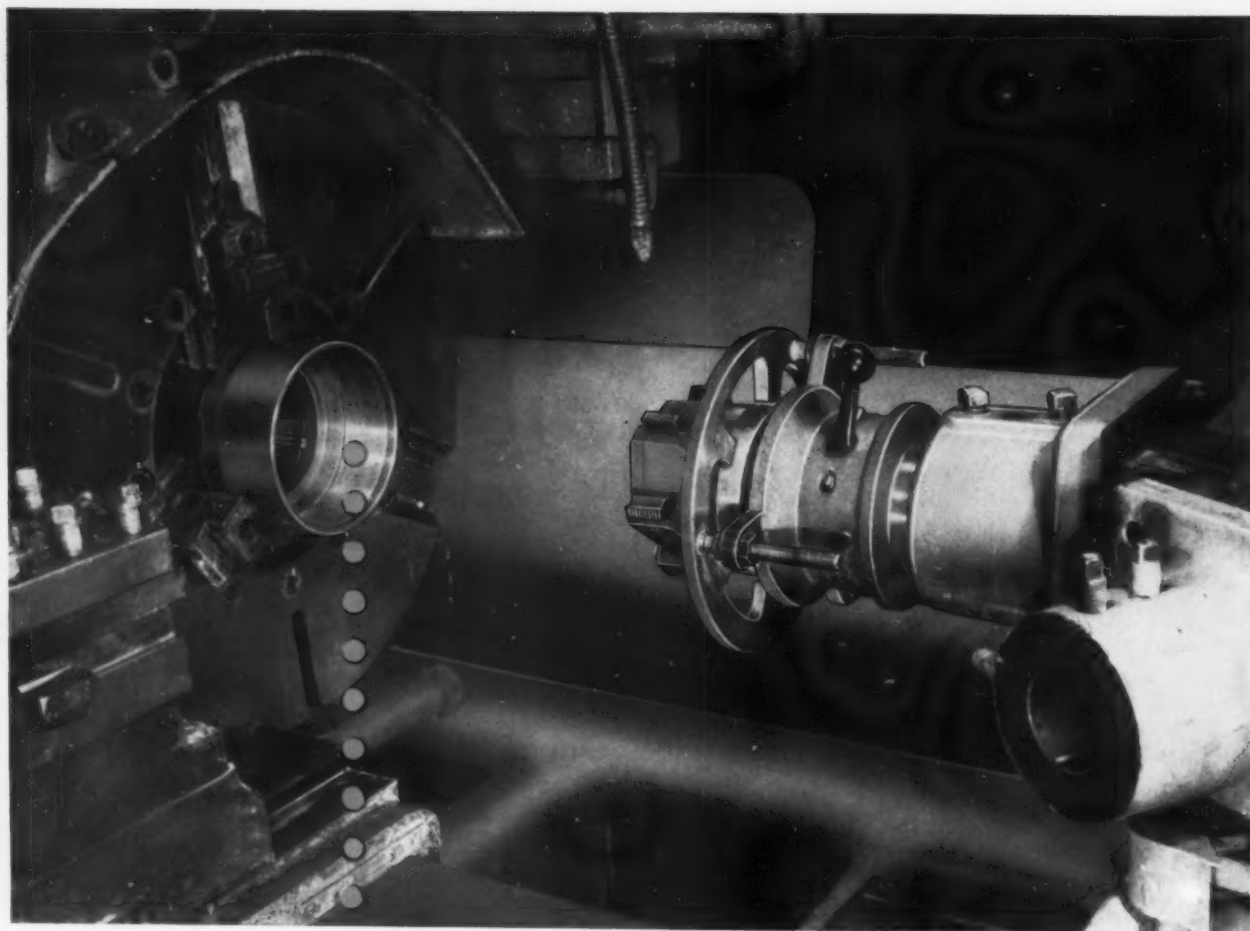
PRODUCT DIRECTORY

282

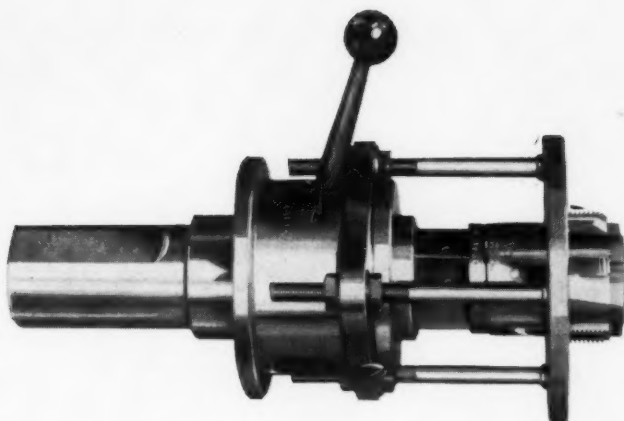


ADVERTISERS' INDEX

369-370



• tapping  
• 7-5/8" threads  
• in  
• tough steel  
•



Rugged construction, allowing heavy metal removal in one pass, is one of the reasons a LANDIS Collapsible Tap is used to thread cylinder retainer caps for heavy duty hydraulic cylinders at the Cleveland Hydraulic Co., Bedford Heights, Ohio.

A LANDIS 6ALT Tap with a 7" head is mounted on a turret lathe for threading 40-50 carbon cast steel normalized from 1600° to 1750°.  $7\frac{5}{8}$ " 8-pitch UN threads are tapped  $2\frac{3}{4}$ " long to Class 2 fit.

Another outstanding feature of the LANDIS ALT Collapsible Tap is the detachable head, permitting the use of tap heads of various sizes and capacities on the same tap body. For example, on the 6ALT illustrated, five heads will allow a threading range  $6\frac{1}{2}$ " to  $13\frac{1}{4}$ ". In addition, each tap head has a relatively wide threading range — the 7" head shown here threads all diameters from  $6\frac{1}{2}$ " to 8". Thus, as a result of the minimum equipment required for such wide range coverage, low initial cost and continuing economy of tooling are assured.

LANDIS ALT Taps may also be used to produce taper threads, with chasers cutting across their entire width if required. For more complete information on the various sizes of ALT Taps for threading all diameters from  $1\frac{1}{4}$ " to  $13\frac{1}{4}$ ", write for Bulletin G-94.

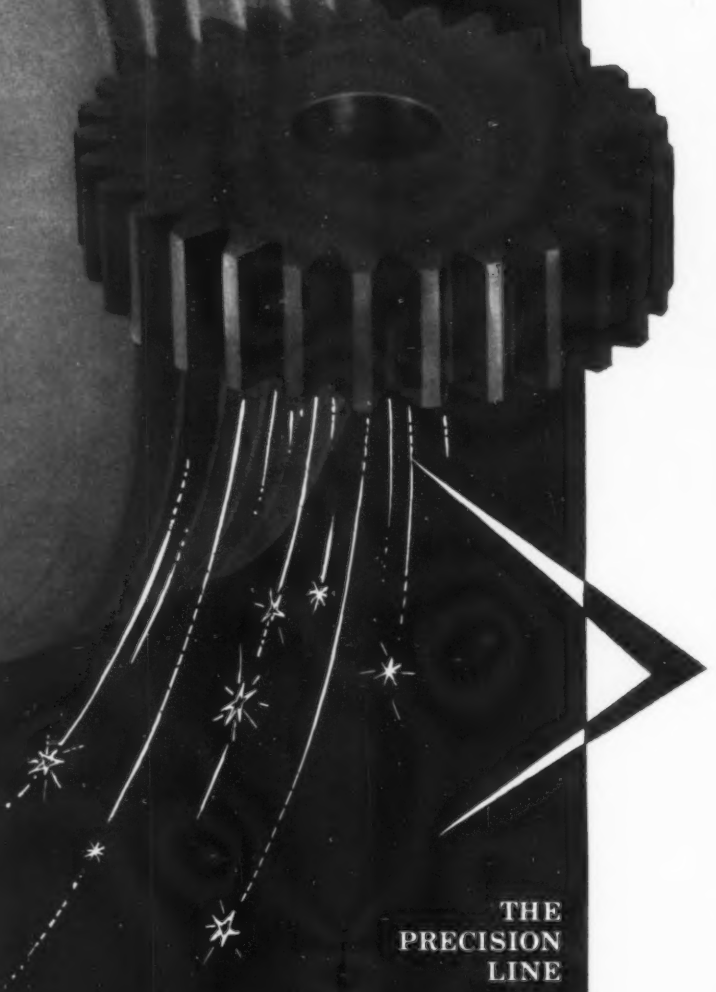
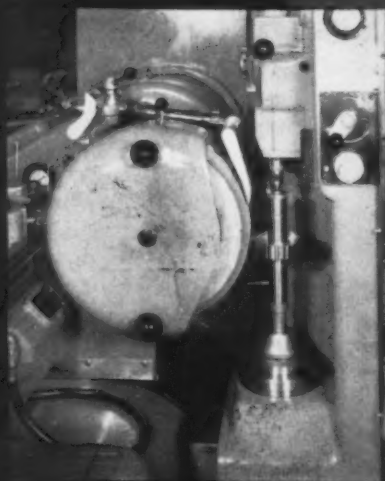
499C

*the world's  
largest  
manufacturer  
of threading  
equipment*

**LANDIS Machine COMPANY**  
WAYNESBORO • PENNSYLVANIA

CUTTING • GRINDING  
ROLLING • TAPPING

# **Gear Grinding** *and*



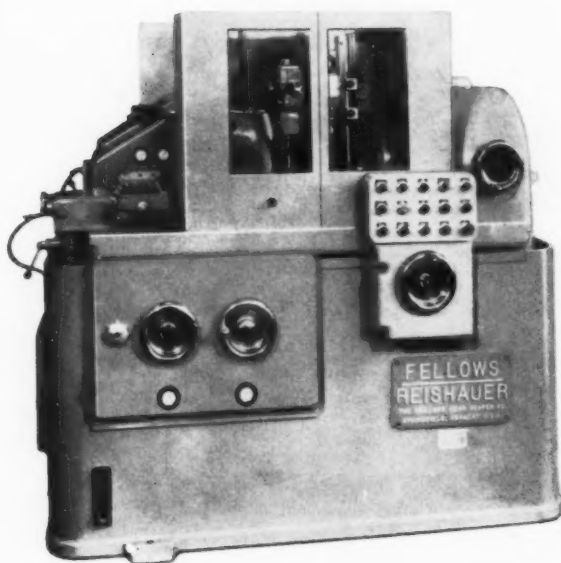
**THE  
PRECISION  
LINE**



# Accuracy

# Production Speed...

*a cost saving combination.*



## FELLOWS-REISHAUER Gear Grinding Machine

*American-made by Fellows*

**Fellows** Gear Production Equipment

Under license from the Reishauer Tool Works Ltd., Zurich, Switzerland, Fellows now manufactures the precision No. 12 Fellows-Reishauer Gear Grinding Machine.

An emery wheel, on which a helix has been developed, generates the gear tooth shape. The tooth section of the wheel is usually that of the basic involute rack. As the wheel turns in harmony with the work while the work passes axially by the wheel, an involute is generated.

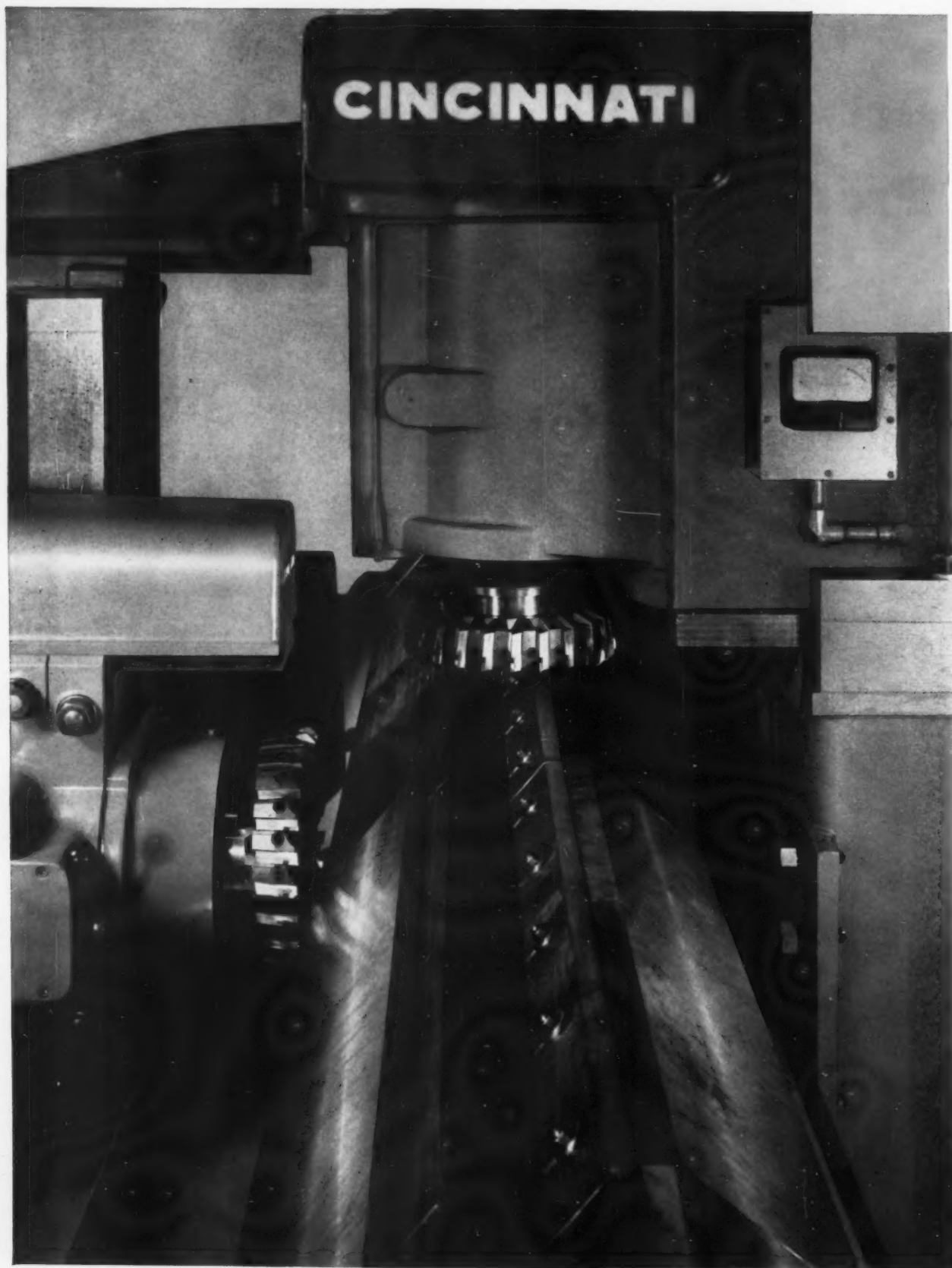
Grinding is done in both directions of travel of the work-slide. Simple, fast machine set-up permits the economical grinding of single piece lots as well as the long production runs.

For grinding spur and helical gears up to 12" O.D. and 6 $\frac{3}{4}$ " face width, the American-made Fellows-Reishauer is outstanding for combined speed and accuracy. Ask your Fellows representative about it.

THE FELLOWS GEAR SHAPER COMPANY  
78 River Street, Springfield, Vermont

Branch Offices:

1048 North Woodward Ave., Royal Oak, Mich.  
150 West Pleasant Ave., Maywood, N. J.  
5835 West North Avenue, Chicago 39  
6214 West Manchester Ave., Los Angeles 45



# HyPowermatic

## with Two 50 hp Spindles

### Mills Several Surfaces of Long Steel Parts

Unusual requirements are commonplace conditions for Cincinnati's Special Machine Tool Division. A manufacturer of a variety of long steel knives, blades and similar parts wanted a machine having the versatility to mill the entire range of these parts, and in addition, rapid rates of metal removal were required. Cincinnati Engineering Service Specialists, using the extensive standard HyPowermatic® line as a basis, developed the special HyPowermatic Milling Machine illustrated here. Excellence of performance may be judged from the following specification highlights:

50 hp motor drive for each spindle . . . table feeds  $\frac{1}{4}$  to 100 ipm . . . spindle speeds 20 to 800 rpm . . . rapid table traverse 200 ipm . . . 168" table travel . . . automatic quill retraction . . . high pressure flushing system for continuous removal of chips

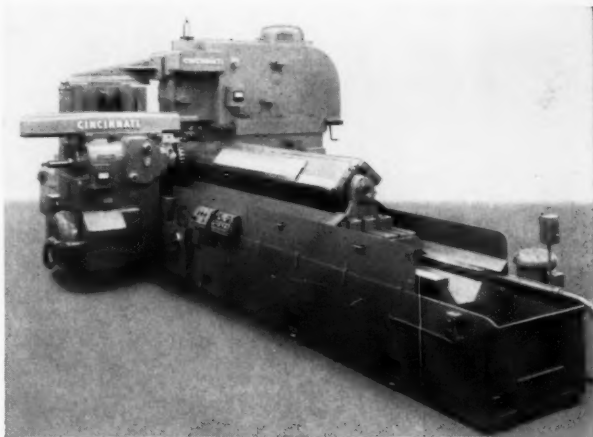
For all milling operations, the work is held on a universal magnetic chuck, energized prior to the table traverse, and equipped with power angular positioning. This machine is typical of single units of production equipment built by the Special Machine Tool Division. Other types of equipment range up to complete production lines. May we show you what we can do to solve your metal-working production problems and their related handling chores? Our Engineering Service team wants to hear from you.

#### Special Machine Tool Division

THE CINCINNATI MILLING MACHINE CO.  
CINCINNATI 9, OHIO



Straddle milling operations, too! The setup illustrated above shows how it's done.

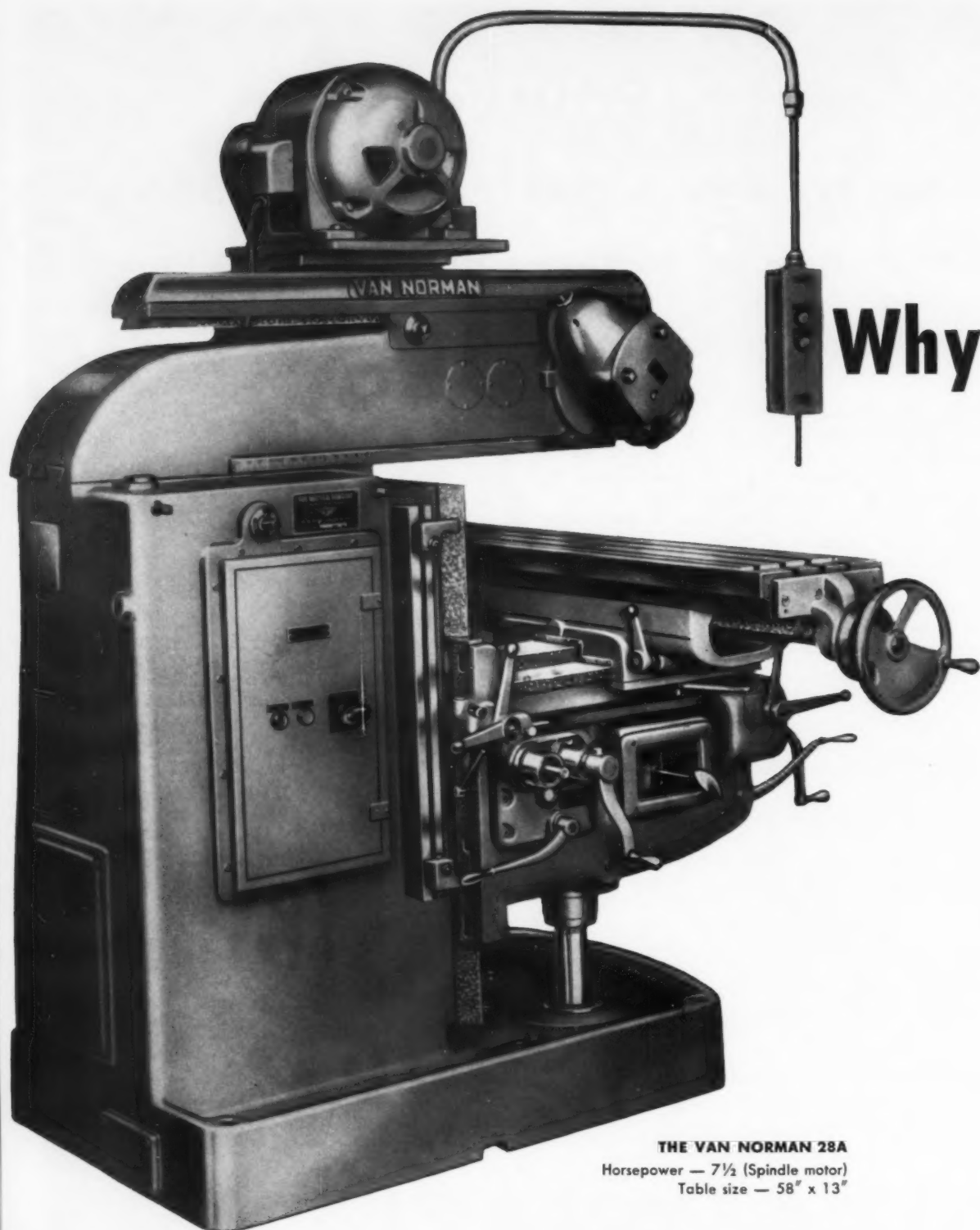


CINCINNATI® Special 100 hp HyPowermatic Milling Machine removes metal in a torrent or a light flurry, as required by the part being milled.

# CINCINNATI



Special Machine Tools and Complete Production Lines



**THE VAN NORMAN 28A**

Horsepower —  $7\frac{1}{2}$  (Spindle motor)

Table size — 58" x 13"

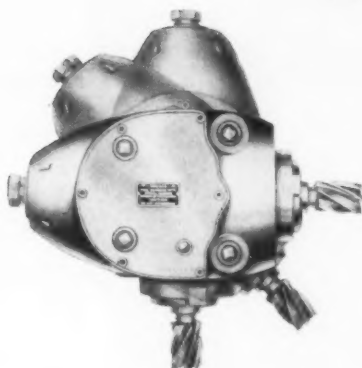
# **VAN NORMAN MACHINE**

A DIVISION OF VAN NORMAN INDUSTRIES, INC.

**MANUFACTURERS OF —** Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.



# Buy 2 When Will Do?



The exclusive Van Norman adjustable cutterhead which can be easily set for horizontal, vertical or angular milling. Remember, with Van Norman millers, the cutterhead moves — not the work.

**ONE Van Norman** When you make *one* investment in *one* Van Norman ram-type miller you're buying the equivalent of two ordinary millers, plus attachments. And your savings are substantial.

*First* — you save important investment dollars . . . *Second* — you save by boosting production . . . *Third* — you save by reducing idle machine and operator time.

Available for all types of milling, Van Norman millers permit horizontal, vertical and angular milling through the exclusive Van Norman adjustable cutterhead. The cutterhead moves — not the work.

Get complete details on the dollar-saving, production boosting Van Norman ram-type millers. Write, wire or phone now for catalog which gives full specifications.

**COMPANY**  
SPRINGFIELD 7,  
MASSACHUSETTS

Don't wait . . . for extra profit install a Van Norman machine now! They are available in many purchase plans . . . Outright sale . . . Purchase on conditional sales contract up to five years . . . Pay as you depreciate up to 10 years. Conditional Sales Contracts not available to Export.

# Exclusive Landis features increase

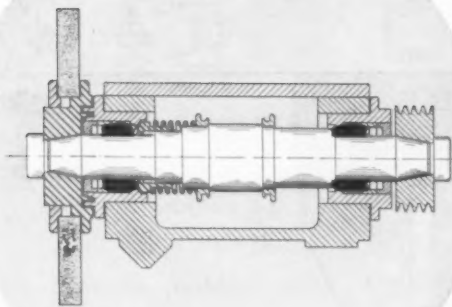


## **LANDIS** precision grinders

*Landis 6'' x 18'' Type CH Plain Hydraulic Grinder*

LANDIS TOOL COMPANY / WAYNESBORO, PENNSYLVANIA

# grinder output



## Landis heavy duty wheel spindle

Extra rigidity for fine finishes, higher production from exclusive Landis spindle design with increased diameter between microsphere bearings.

## Landis microsphere spindle bearings

Extremely close running clearance of spindle bearing gives fast sparkout and sensitive response to wheel feed. Rigid, one-piece construction for heavier cuts to close tolerances.



## made in 4 sizes

Suitable for traverse or infeed grinding of medium size work parts on long or short production runs.

| condensed specifications         | 6" type<br>CH plain | 10" type<br>LCH plain |
|----------------------------------|---------------------|-----------------------|
| Maximum diameter work swing      | 6 3/4"              | 10 3/4"               |
| Lengths between centers          | 18" or 30"          | 18" or 30"            |
| Standard grinding wheel diameter | 24"                 | 24"                   |
| Wheel drive motor                | 7 1/2 hp            | 7 1/2 hp              |
| Net weight—30" machine           | 6500 lbs.           | 6600 lbs.             |



## Landis eye-level wheel feed

Location of grinding wheel feed handwheel permits operator to see both grinding operation and handwheel graduations from normal working position. Easier, more accurate operation saves time.

**REDUCE COSTS  
ON  
FORMED STAMPINGS**



PIERCE



PIERCE

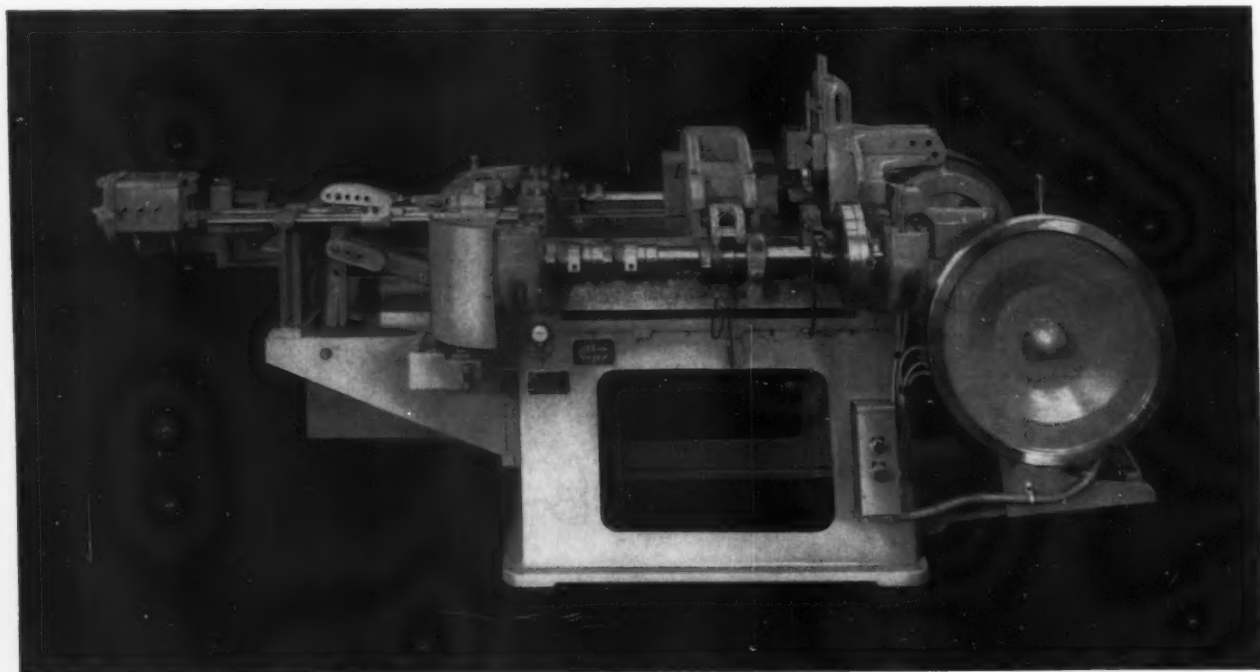


BEND

WITH

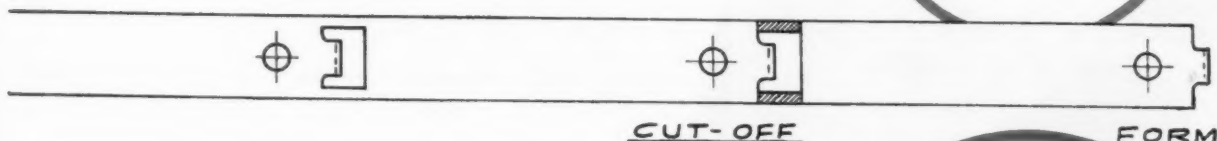
**U. S. MULTI-  
SLIDES®**

Below: The No. 33 U. S. Multi-Slide used with appropriate tooling to produce the formed metal stamping illustrated on the opposite page. The No. 33 Multi-Slide has a capacity for material up to 2½" wide, with feed length adjustable up to 12½".





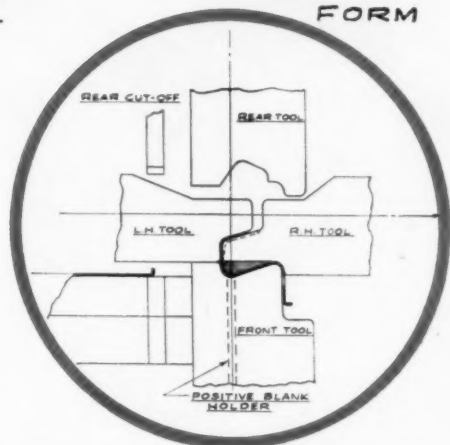
Formed metal stamping produced complete on the U. S. Multi-Slide. Drawings below indicate the progressive operations in the dies and forming position.



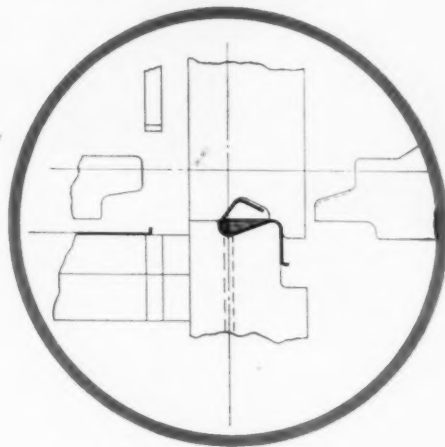
If you produce formed metal stampings, the U. S. Multi-Slide may be the answer to your cost reduction problems. The part illustrated is just one of the many different types of stampings that can be produced complete on the U. S. Multi-Slide—without secondary handlings. The combination of ram action, four-slide forming, vertical stripper, and various auxiliary units allows for the designing of tools to produce intricate parts complete—without the need for secondary operations . . . and every such operation that can be eliminated increases your profit potential.

Since these movements are an integral part of the machine equipment, it is not necessary to build complicated movements into the dies themselves, thereby giving the added advantage of reduced tool maintenance cost.

Investigate! Ask for a copy of Bulletin 15-A, or send us samples or drawings of your parts for our recommendations.



Operations in the forming position: Above: front, right-hand and left-hand tools entered to preform part around post. Below: right-hand and left-hand tools retracted; front and rear tools entered to complete the form.



# U. S. TOOL COMPANY, Inc.

AMPERE (East Orange)

NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers — U. S. Die Sets and Accessories — U. S. Automatic Press Room Equipment

# THE HIGHEST

... is ground on



Spiral bevel gear, being ground on the sleeve diameter, is typical of the high-quality work assigned to CINCINNATI FILMATIC Plain Hydraulic Grinding Machines.



Large diameter sleeve gears and other expensive parts are precision ground with confidence on a Cincinnati.



# CINCIN

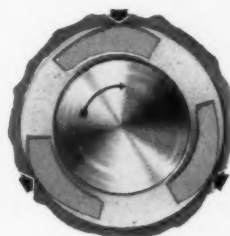
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE

# QUALITY WORK

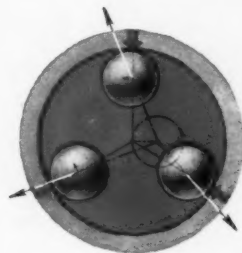
## CINCINNATI Filmatic Plain Hydraulic Grinders

The craftsman's skill in producing extra high-quality work is incorporated in CINCINNATI® FILMATIC Plain Hydraulic Grinding Machines. That's why comparatively inexperienced operators can do an excellent job. Exclusive features such as FILMATIC grinding wheel spindle bearings, an exclusive feature, run for years without requiring maintenance or adjustment. Others include anti-backlash device on the infeed screw . . . automatic pickfeed infinitely variable from .0001" to .0025" . . . single lever control. Extra equipment available for production work includes automatic air-electric gage sizing . . . push-button automatic dual rate infeed . . . 37 additional items. May we tell you more about CINCINNATI FILMATIC Plain Hydraulic Grinding Machines? Ask for catalogs listed in the spec table, or look in Sweet's Machine Tool File for brief data.

**CINCINNATI GRINDERS INCORPORATED**  
CINCINNATI 9, OHIO



FILMATIC grinding wheel spindle bearings, an exclusive feature, run for years without requiring maintenance or adjustment.



Freely rotating steel balls automatically balance the wheel mount assembly when unclamped. Perfect balance is attained in a few seconds.



**CINCINNATI FILMATIC 6"R Plain Hydraulic Grinding Machine.** There are four sizes in this line of fine precision grinding equipment:

# NATI

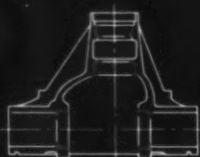
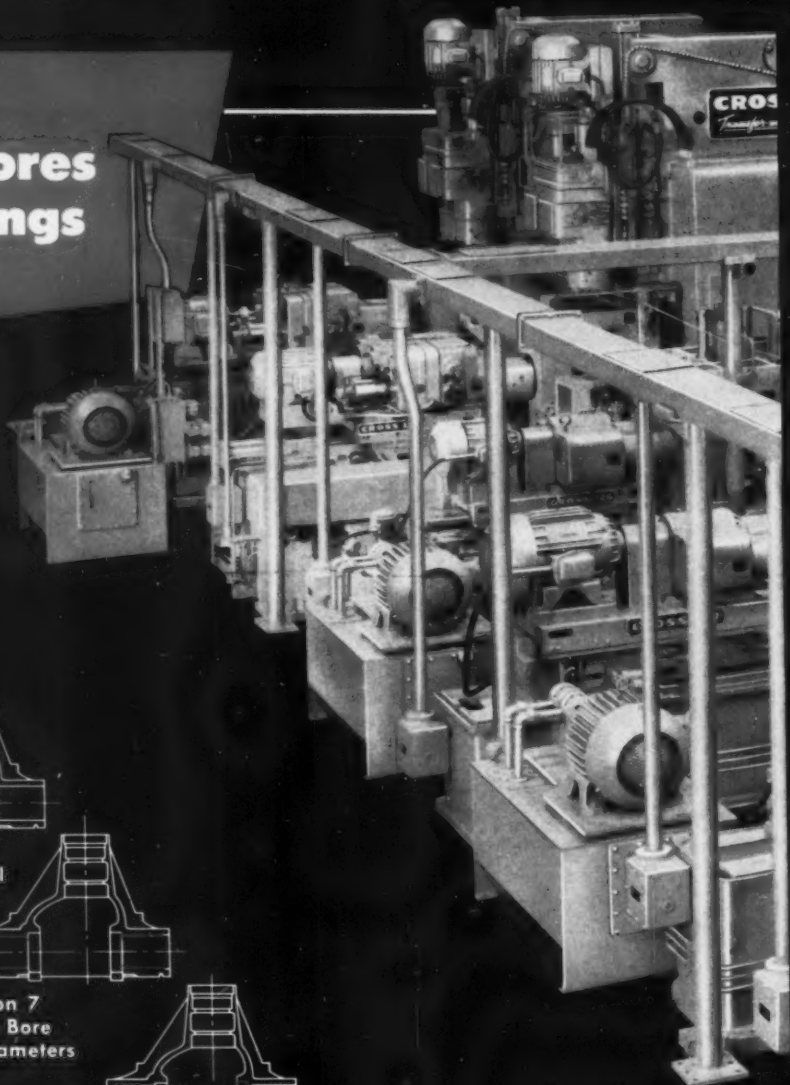
| Size             | Between-Center Lengths       | Catalog |
|------------------|------------------------------|---------|
| 6"R }<br>10"L }  | 18" and 30"                  | G-660-2 |
| 10"R }<br>14"L } | 18", 36", 48"<br>72" and 96" | G-661-1 |

**GRINDING MACHINES • CHUCKING GRINDERS • MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES**

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—15

# Precision Bores Axle Housings



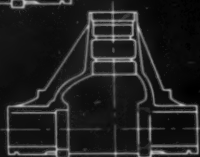
Station 11  
Finish Bore  
Four Bearing Seats



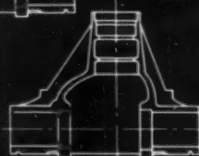
Station 9  
Semi-Finish Bore Oil Seal  
and Bearing Seats



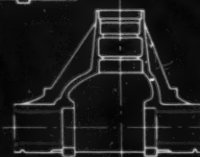
Station 7  
Finish Bore  
Tube Diameters



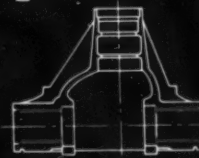
Station 5  
Rough Back-bore  
Right Side



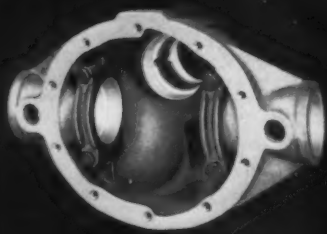
Station 4  
Rough Back-bore  
Left Side



Station 3  
Semi-Finish Bore  
Tube Diameters



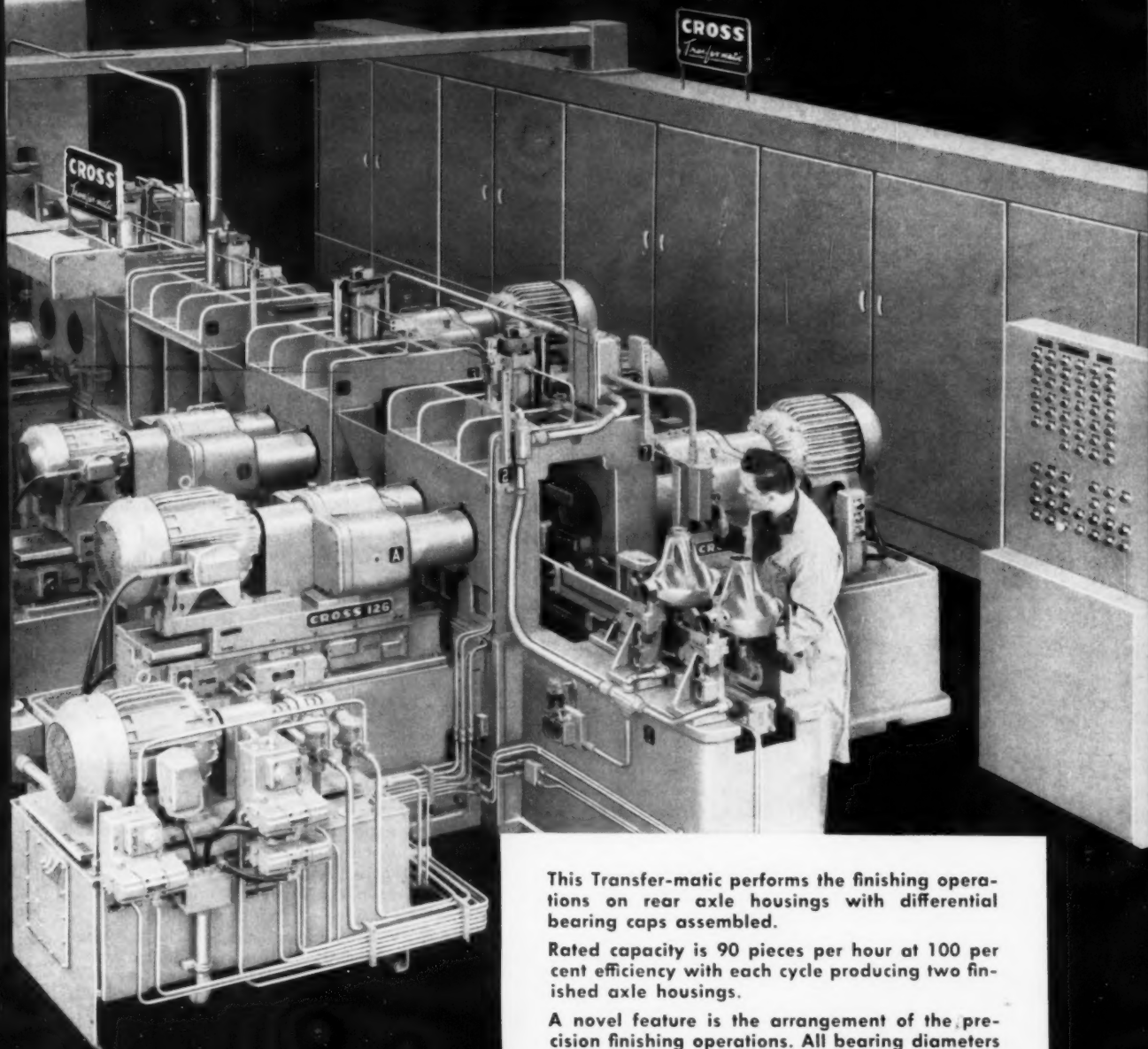
Station 2  
Rough Bore  
Tube Diameters



Station 1  
Load Two Parts



## *Another Transfer-matic by Cross*



This Transfer-matic performs the finishing operations on rear axle housings with differential bearing caps assembled.

Rated capacity is 90 pieces per hour at 100 per cent efficiency with each cycle producing two finished axle housings.

A novel feature is the arrangement of the precision finishing operations. All bearing diameters are precision bored in the same station to assure precise gear centers. The vertical boring unit finishes first one and then the other of the two pinion shaft bearing diameters. In the same station, opposed horizontal units back-bore the differential bearing diameters. Perfect concentricity and squareness of the shoulders are obtained between the two pinion bearing seats since both are bored with the same spindle.

Other features are complete interchangeability of all standard and special parts for easy maintenance, construction to JIC standards, hardened and ground ways, hydraulic feed and rapid traverse and automatic lubrication.

Established 1898

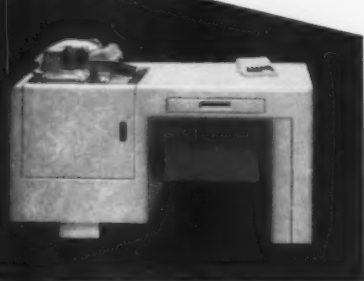
THE **CROSS** CO.

*First in Automation*

PARK GROVE STATION • DETROIT 5, MICHIGAN

# Here are the facts about

*How Giddings & Lewis NUMERICORD system of machine tool automation boosts production, increases accuracy on a wide range of machining operations*



Pre-calculated data, tooling studies and feed rates in decimal form are accepted by preparation desk for punching paper tape.



Computing director converts decimal numerical data on paper tape into time-coordinated continuous electric signals... also accepts output data from standard computer program.



Magnetic tape recorder impresses all electrical signals from director on appropriate channels of a master magnetic tape.

Tape playback and machine control unit reads magnetic tape to control all axes and auxiliary functions of the machine tool automatically.

## 1 Is this type control system ready for production use?

Definitely! Giddings & Lewis machines have operated under NUMERICORD tape control for almost three years. They have proved that complicated, short-run jobs — some un-machinable by other methods — can be turned out with higher accuracies at greater production rates — in less

factory space and with less time from drawing to finished part — with less total equipment. In fact, for any type of machine on which work can be programmed, Giddings & Lewis is ready to supply the proved advantages of NUMERICORD system of machine tool automation.

## 2 What is the scope of G&L's "hi-fi" machine tool programming?

Giddings & Lewis is a pioneer in numerical control.

• The G&L NUMERICORD system for machine tool automation was originally developed in collaboration with scientists from the Massachusetts Institute of Technology.

• G&L will design, build and install all equipment; then fully train your personnel in the operation of complete numerical control systems including all functions — programming, data processing, tape preparation and machine control.

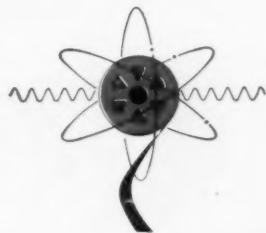
## 3 How much will NUMERICORD cost?

While far more versatile, NUMERICORD's first cost is not as high as machines with one-to-one tracer control. Actually, of course, the correct basis for judging the economics of such an investment is *cost per machined piece*. When correctly applied, NUMERICORD can reduce this figure spectacularly by minimizing set-up time, increasing machine capacities, running equipment continuously,

repeating without error, improving tool life, and reducing rejects caused by operator's error. It has been estimated that production capacity with numerical control is three times that of current methods in one-half the space. And to hold your investment down, G&L will make magnetic tapes for you — you need purchase our machine-control play back and the necessary machine tool or tools.



# numerical control!



## 4 Are machines *now* available to make the most of NUMERICORD?

Yes. The following Giddings & Lewis machine tools can be programmed for discrete position or path control: Horizontal Boring, Drilling and Milling machines (table, planer and floor types); planer-millers in various multiple cutting head arrangements; skin and spar milling equipment with single and multiple head arrangements; VARIAX (variable axis control con-

tour milling machines); vertical boring mills; Kaukauna vertical turret lathes; Cincinnati Bickford radial drilling equipment using automatic table positioning; Kaukauna horizontal and universal boring, drilling and tapping machines.

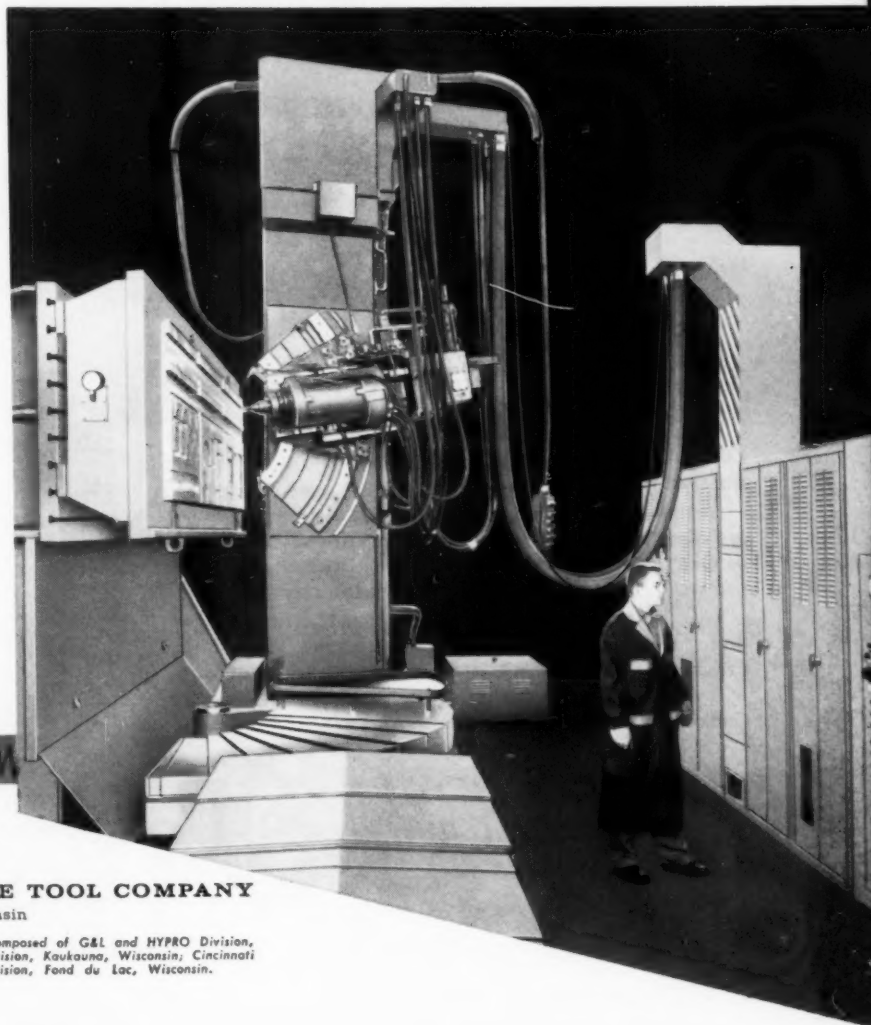
Consider the VARIAX contour mill-

ing machine, shown below. Coupled with NUMERICORD, this is the only machine tool on the market today that provides *five* simultaneously and automatically controlled axis motions.

And through their Davis Boring Tool Division, G&L can tool all machines for any program.

Don't be confused by all the current publicity on numerical control. Come to G&L for straight-forward answers to any questions. At no obligation to you, G&L will evaluate the feasibility of this equipment for your operation and recommend programming procedure. G&L also offers complete programming service for G&L tools and their associated numerical control systems. And for a preliminary idea of how NUMERICORD works on production machines, ask your distributor for a private showing of color-sound moving pictures featuring present applications.

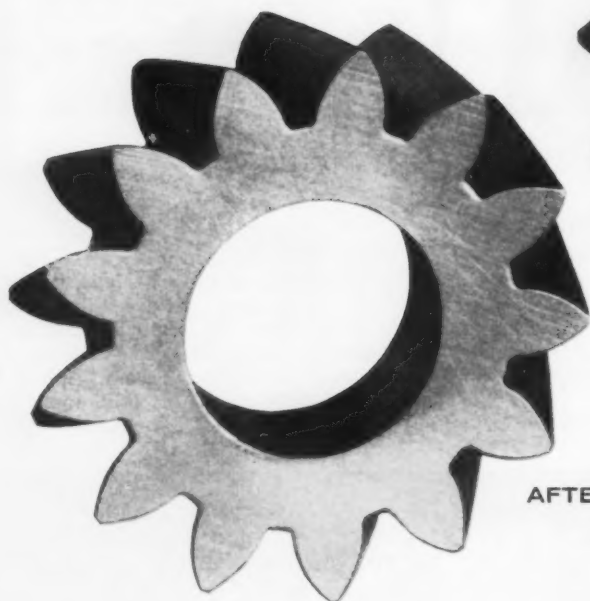
VARIAX contour milling machine designed for high speed contour milling of aircraft structural components and other similarly complex parts in a variety of configurations. Machine movements and functions are fully automated with NUMERICORD for maximum operating efficiency.



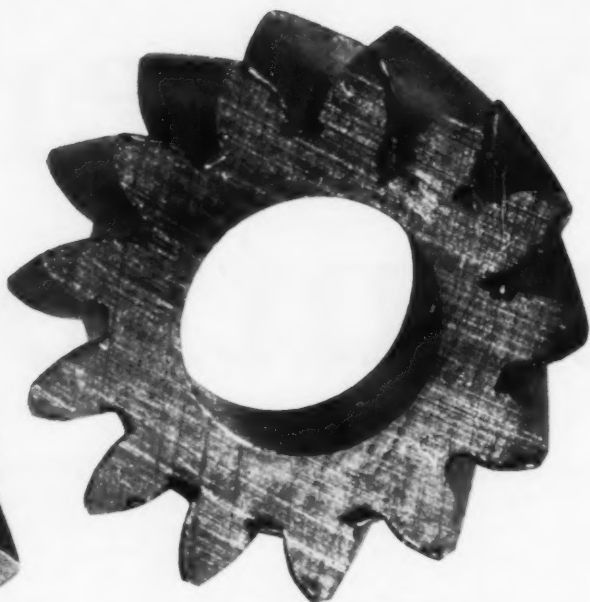
## GIDDINGS & LEWIS MACHINE TOOL COMPANY

Fond du Lac, Wisconsin

Builders of the world's most modern machine tools and composed of G&L and HYPRO Division, Fond du Lac, Wisconsin; Kaukauna Machine & Foundry Division, Kaukauna, Wisconsin; Cincinnati Bickford Division, Cincinnati 9, Ohio; Davis Boring Tool Division, Fond du Lac, Wisconsin.



AFTER BRUSHING



BEFORE BRUSHING

## How trouble-free transmissions get that way

... with OSBORN Brushmatic® Method

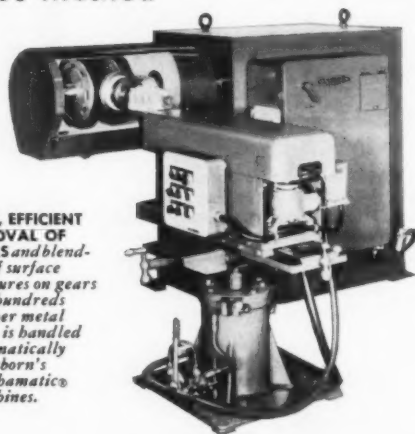
**W**HEN even the smallest chips or burrs get into an automatic transmission—there's trouble.

That's why leading automotive producers *depend* on Osborn Power Brushing to finish gears and other transmission parts.

At the same time, sharp corners and surface junctures are blended to reduce stress concentrations . . . the cause of many gear failures. Osborn Power Brushing does the job fast . . . efficiently at mass production rates.

This is the kind of job Osborn Power Brushing can do for *you*—no matter what you manufacture. An Osborn Brushing Analysis, made in your plant at no obligation, will show you how. Write us. *The Osborn Manufacturing Company, Dept. D-40, Cleveland 14, Ohio.*

**FAST, EFFICIENT  
REMOVAL OF  
BURRS** and blending of surface junctures on gears and hundreds of other metal parts is handled automatically on Osborn's Brushmatic® Machines.



Osborn Brushes 


Write for your copy of the  
100-page Osborn Catalog 210-C  
and the 20-page  
Brushmatic® booklet.

BRUSHING MACHINES • BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES • FOUNDRY PRODUCTION MACHINERY





## Production per disc increased over six times:

1. By change to disc with new 
2. By special use of large single-point diamond dresser

*Grinding both ends and bottom of cast iron transmission cases. Machine is Gardner 179-72" Horizontal Disc Grinder.*

... Another example where Gardner's combined knowledge of both machines and abrasives paid off profitably. Call the Gardner Man for a practical, economical solution to your flat surfacing problem.

**GARDNER**  
abrasive discs  
BELOIT, WISCONSIN







### heavy-duty planing

The Gray Universal is the world's most powerful planer available for conventional planing. Its rigidity and speed are ideally suited for modern carbide cutting.



### double-cutting

The flick of a lever, the touch of a button permits double-cutting. Elimination of the idle stroke insures the world's most efficient flat surface machining. Only simple carbide tools are required.



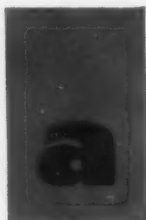
### triple-cutting

Rough and rough-finish plane at the same time. Rough by double-cut planing and simultaneously rough-finish with a single point tool. Then finish plane without a tool change.



### cross planing

Eliminates extra settings by cross planing the occasional keyways, chamfered corners, and other troublesome small cross surfaces that formerly added hours to your set-up time.



# GRAY

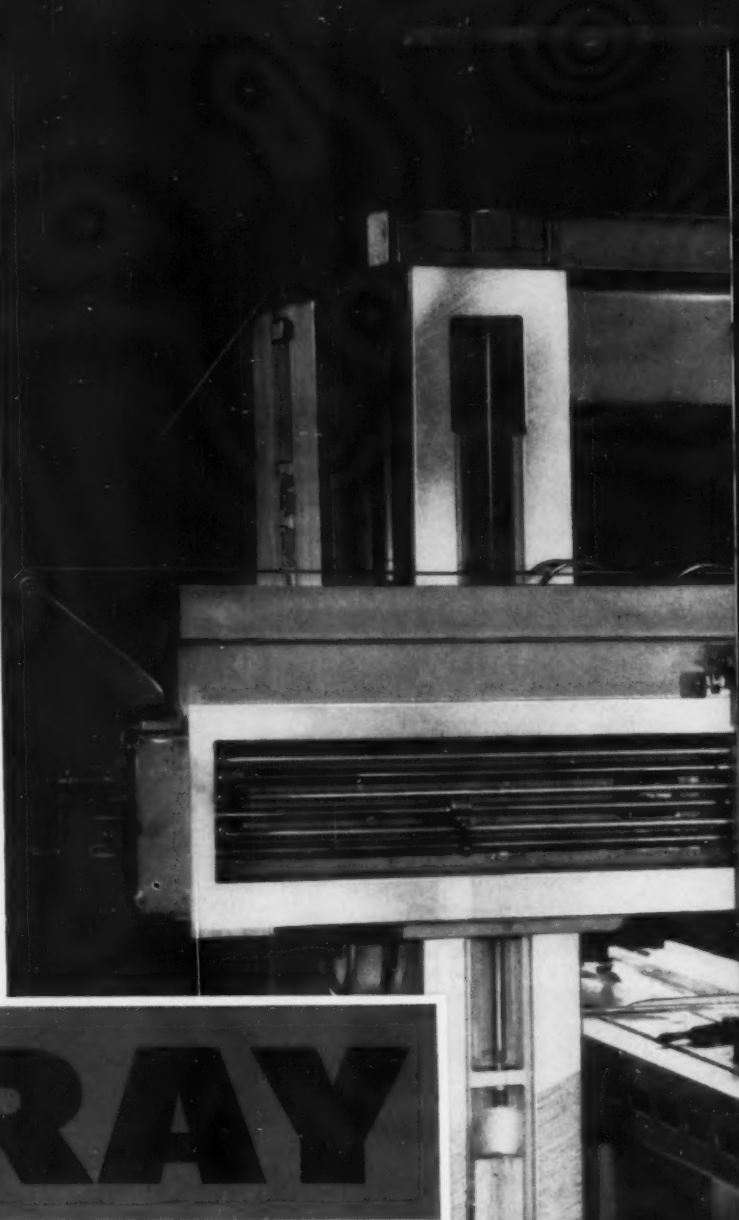
This new 84" x 60" x 18' Gray Universal Planer shown in operation at the Koppers Co., cuts going - cuts coming, removes big chips at double rate. There is no idle return stroke to waste precious production hours. Instantaneous reversals with heavy duty double-cutting make this the first **REAL** new development in modern planers... *a GRAY exclusive.*

Double tables further virtually eliminate the costly set-up time required by ordinary planers.

The multiple savings received by users of the new Gray Universal make it a wise investment.

*If it's new... it must be a GRAY.*

The G. A. GRAY Co.,  
Cincinnati, Ohio



## the only



**GRAY**

GRAY Universal Planer shown in operation  
at the Baltimore plant of Koppers Company, Inc.,  
Metal Products Division.

**new planer**



**AT YOUR  
SERVICE...**

**the NEW MARVEL SAWING  
DEMONSTRATION ROOM!**

**The Complete Marvel  
Line of Hack Saws and  
Band Saws Operating!**

**...available for  
demonstration or  
testing on your  
own material!**

How would you like to run sawing tests on your own material... watch demonstrations under actual working conditions, of the world's most modern hack saws and band saws—and compare, if you wish, band sawing and hack sawing to see which type of saw is best for you?

You are cordially invited to come in to see and make use of the Sawing Demonstration Room—the most complete and up-to-date facility of its type in the country. Staffed by experienced metal sawing engineers and technicians, the Sawing Demonstration Room has been set up for your convenience. We sincerely believe you will find it interesting and helpful in your selection of metal sawing equipment.

Here, you will see the most modern single cut and automatic bar feed hack saws and band saws (including the *all new* MARVEL No. 81 and 81A Universal Hydraulic Band Saws equipped with the amazing "TRUE-LINE" Automatic Blade Control (Basic Patent Applied For) and using High Speed Steel Band Saw Blades.)

If you have any type of sawing problem, or if you would just like to come in and see a demonstration of the fine cutting MARVEL Saws can do, the Demonstration Room is always open to you.



**ARMSTRONG-BLUM MFG. CO.**  
5700 W. BLOOMINGDALE AVE., CHICAGO, ILL.



# THE OLD GRIND GOT YOUR GOAT?

Butt definitely, a good way to meet grinding-wheel problems is . . . head-on. Take your goat by the horn and switch to CINCINNATI (PD)<sup>®</sup> WHEELS.

They offer Positive Duplication—a remarkable achievement in precision manufacturing and quality control that can save you money . . . and increase your production.

You don't need a long gray beard to wise up to (PD) WHEELS. Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel every time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS are priced no higher than ordinary wheels.

Grinding problems will never again get your goat, if you see your Cincinnati Grinding Wheels Distributor. He'll be glad to explain how (PD) WHEELS can save you money and increase production. Or, contact us direct and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—only CINCINNATI Grinding wheels give you

**PD** POSITIVE DUPLICATION

**CINCINNATI<sup>®</sup>**  
*Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Trade Mark Reg. U.S. Pat. Off.

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—25

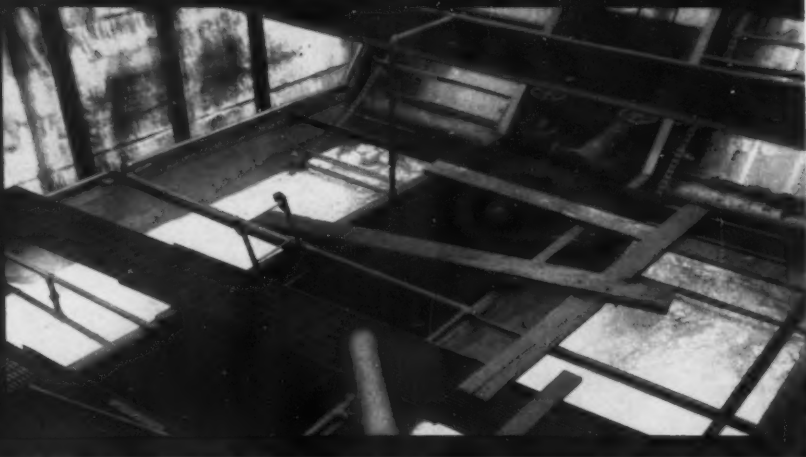




# CODOL

## LIQUID GRINDING COMPOUND

Disc grinder (right) hogs off approximately .035 in. from rough Alnico castings. Small segmented bar-type magnets are ground at a high rate of production on an automatic double-spindle disc grinder. Stuart's Codol helps maintain profitable production . . . covers machine ways and moving parts with a rust-inhibiting film of light petroleum oil.



Continuous grinding is more efficient with Codol as it resists overheating, minimizes wheel loading . . . reduces downtime for sharpening the wheel.

Codol's stability prolongs its effectiveness, reducing cutting oil costs. More than 15,000 gallons of a 3.5 per cent Codol and water solution are circulated from this outdoor reservoir to a battery of grinders in the Spaulding Works of Crucible Steel Company.

**How you can use  
Stuart's CODOL to  
step up production  
and reduce costs!**

Take advantage of today's improved wheel bonds and more powerful grinding machines by using Stuart's Codol Liquid Grinding Compound . . . a carefully formulated combination of petroleum oil and emulsifier. To give you maximum on-the-job economy, Codol permits faster stock removal, using heavier feeds and harder, larger wheels. For Codol *lubricates* as it cools, prevents metal flow and wheel loading, and eliminates stress failure from heat generated by grinding. On precision work, Codol guards against heat distortion and assures maximum dimensional control . . . especially important when grinding thin-walled parts. Break the heat barrier and upgrade performance on your cylindrical, centerless, and surface grinding operations with Stuart's Codol!



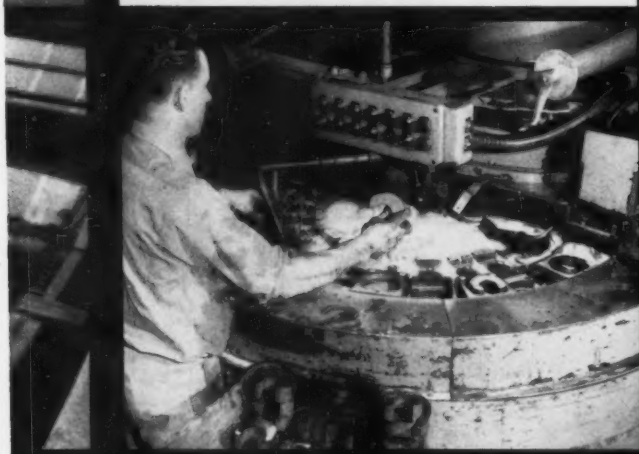
"Rust problems eliminated with Stuart Codol," that's the report from the Spaulding Works of Crucible Steel Company, Harrison, N. J.—makers of widely used Alnico magnets. Experience there on several different grinding machines has proved that Codol's high detergency, lubricity, cooling, and rust-inhibiting characteristics save money by reducing machine wear . . . prolonging wheel life . . . providing good stock removal conditions for rough- and finish-grinding operations.

Since these grinders are serviced from a central reservoir, a highly developed water-mix compound is important for over-all production efficiency at Crucible.

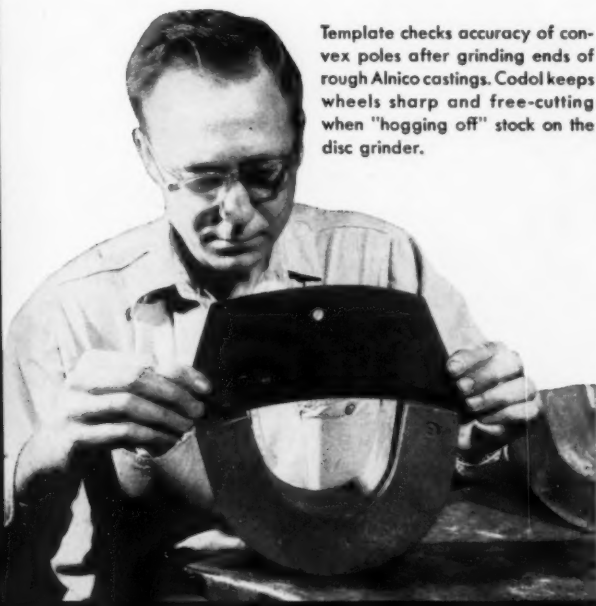
Codol's carefully balanced surface tension floats chips away from the wheel, work, and machine . . . provides a protective film of lubricating oil for machine ways, guide bars, and moving parts . . . gives two-way cooling action that assures efficient grinding at high production rates.

## Crucible Steel Co. eliminates rust, reduces machine wear, grinding with Stuart's Codol!

Codol keeps wheel free-cutting on this high-production, single-pass grinding operation, with .0025 in. downfeed per revolution.



Template checks accuracy of convex poles after grinding ends of rough Alnico castings. Codol keeps wheels sharp and free-cutting when "hogging off" stock on the disc grinder.



Phone your  
Stuart Service Center

Arrange now to test Stuart's Codol on your difficult grinding jobs.

|                   |                   |
|-------------------|-------------------|
| DETROIT, MICH.    | Tyler 7-8500      |
| CHICAGO, ILL.     | Bishop 7-7100     |
| HARTFORD, CONN.   | Jackson 7-1144    |
| CLEVELAND, OHIO   | Prospect 1-7411   |
| PHILADELPHIA, PA. | Devonshire 8-6100 |
| TORONTO, CANADA   | Oxford 9-9397     |

*Representatives in all principal cities*

SINCE 1865

**D. A. STUART OIL CO., LIMITED**

2727 South Troy Street, Chicago 23, Illinois

**CANADIAN D. A. STUART OIL CO., LIMITED**

3575 Danforth Avenue, Toronto 13, Ontario



**METALWORKING  
LUBRICANTS**



*At Reliance Electric and Engineering Co.*

## **This 4-A Turret Lathe will pay itself off in only 3 years!**

By eliminating a time-consuming operation and permitting higher surface speeds in machining electric motor frames — while still maintaining desired accuracy and finish — this versatile Warner & Swasey has more than cut production time in half.

The Reliance Electric & Engineering Co. plant in Ashtabula, Ohio, had a definite problem. They wanted to increase production—lower costs on machining five basic sizes of AISI 1010 and 1020 steel DC motor frames in small lots—25 to 30 pieces. This job required two different vertical turret lathe operations to hold a .002" tolerance in counterbores and a .005" tolerance in the through bores.

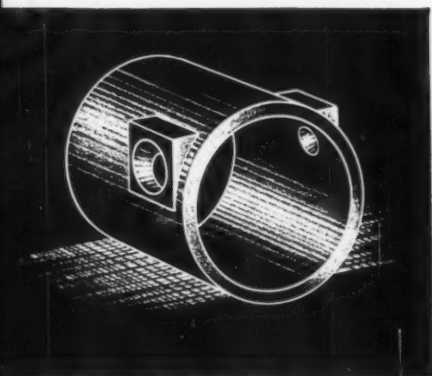
After an exhaustive survey of available machining equipment, Reliance selected a new Warner & Swasey 4-A Saddle Type Lathe, with a cross sliding hexagon turret, to handle this important job.

Now, due to the rigidity and accuracy of the 4-A's self-guiding Vee-Ways, and flexibility of cross sliding turret tooling, all frame sizes are easily completed in only one chucking operation holding .002" in

all bores. Only size and stop adjustments are required when changing sizes. Thus, set-up time has been reduced  $\frac{1}{2}$  to  $\frac{2}{3}$  with the Warner & Swasey on the job.

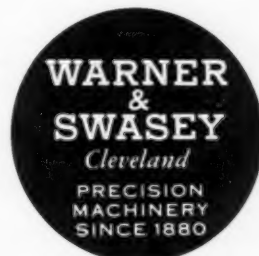
Carbide tooling and the availability of faster speeds in the 4-A's all hydraulic headstock—plus the rugged design of the lathe, tooling and fixture—have more than doubled machining speeds. On larger frames rough and finish boring is done up to 1050 SFM—smaller sizes are roughed at 880 SFM and finished at 1206 SFM.

If your jobs require extreme machining accuracy with heavy metal removal, call in our nearest Field Representative. He'll show how the right machine—with the correct tooling—can most efficiently increase your production—and profits, too.



**YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS**

**... WITH A WARNER & SWASEY**



**no wonder this shop is** "100%



*here are 2 good reasons*

## Machine Utilization

The result of extreme machine rigidity which maintains precise tool settings throughout the run . . . keeps down-time to an absolute minimum (in this case an average of only 16 minutes per machine per shift).

98%

## Cycle Efficiency

Made possible by Acme-Gridley Controlled Cycle operation, which assures a steady, predetermined production pace.

75%



# Acme-Gridley"



"We call 'em workhorses" says Mr. Bob Barnd, Factory Manager of Eaton Screw Products Plant, Tube & Hose Fittings Division of the Parker Appliance Co., describing the Acme-Gridley Bar Automatics and Chucks in this 100% Acme-Gridley equipped Eaton Ohio plant.

Carefully kept records certainly prove these Acme-Gridleys can take it. They are operated two 8-hour shifts a day, five days a week—with a utilization factor of 98%, combined with a cycle efficiency of 75%. In a period of one month, they produce well over two million hydraulic tube and hose fittings. "The machines themselves," says Mr. Barnd, "are largely re-

sponsible for our low down-time. Once setup, they are rigid enough to maintain the most precise setting, shift after shift."

\* \* \* \*

This is typical of Acme-Gridley performance all over the world. It is the end result of two important Acme-Gridley basic design features: (1) *controlled cycle time*, which maintains a steady, hour-after-hour, predetermined production pace; and (2) *extreme machine rigidity*, that comes from being built with an ample reserve of beef, properly distributed, for an extra margin of assurance today—and for any additional burden tomorrow's tooling requirements may place upon them.

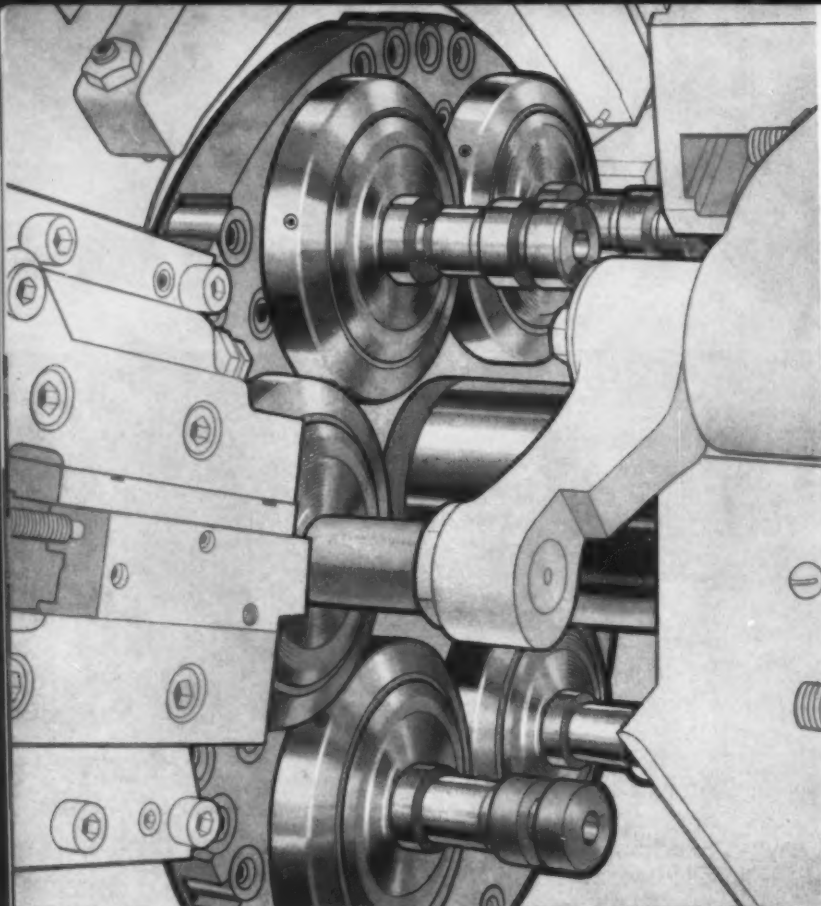
*why don't you*

**INDEX** ... to lower  
machining costs...  
  
with *Acme-Gridley*  
**CONTROLLED CYCLE**

# National Acme

THE NATIONAL ACME CO.  
179 EAST 131ST STREET  
CLEVELAND 8, OHIO  
Sales Offices ... Newark, N. J. ... Detroit, Mich. ... Chicago, Ill.

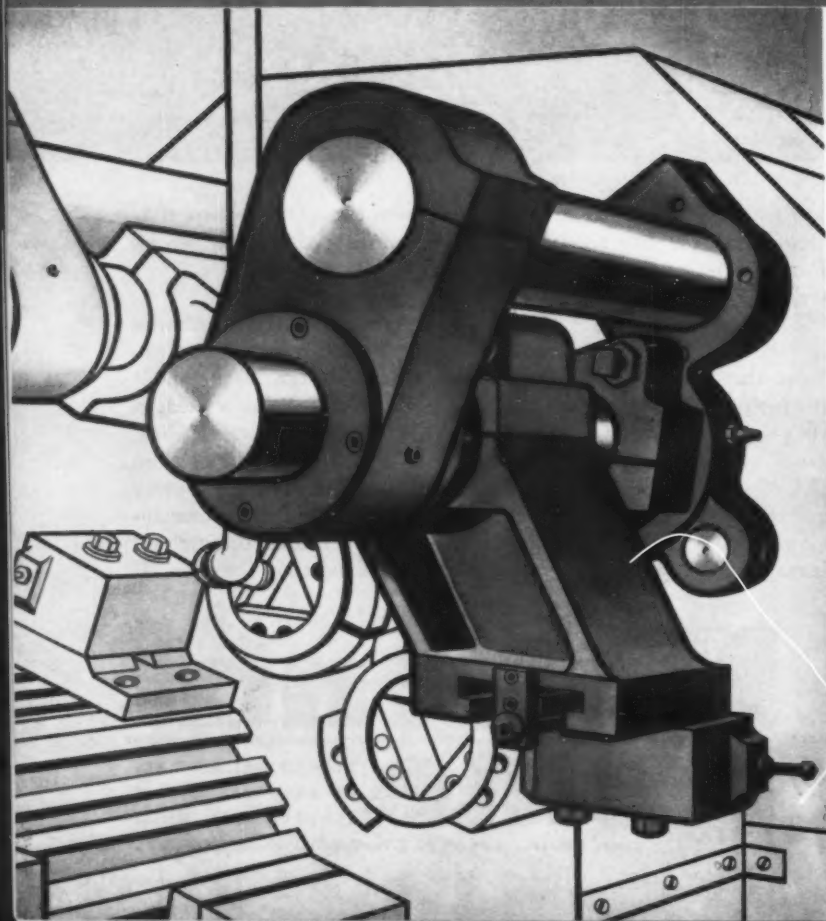




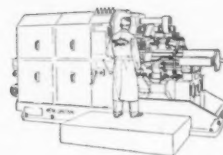
*Look at New Britain's*  
**new automatic  
 bar machines**



The widest range of spindle speeds  
 among machines of comparable ca-  
 pacity and accuracy.



*Look at New Britain's*  
**exclusive  
 chucker arms**

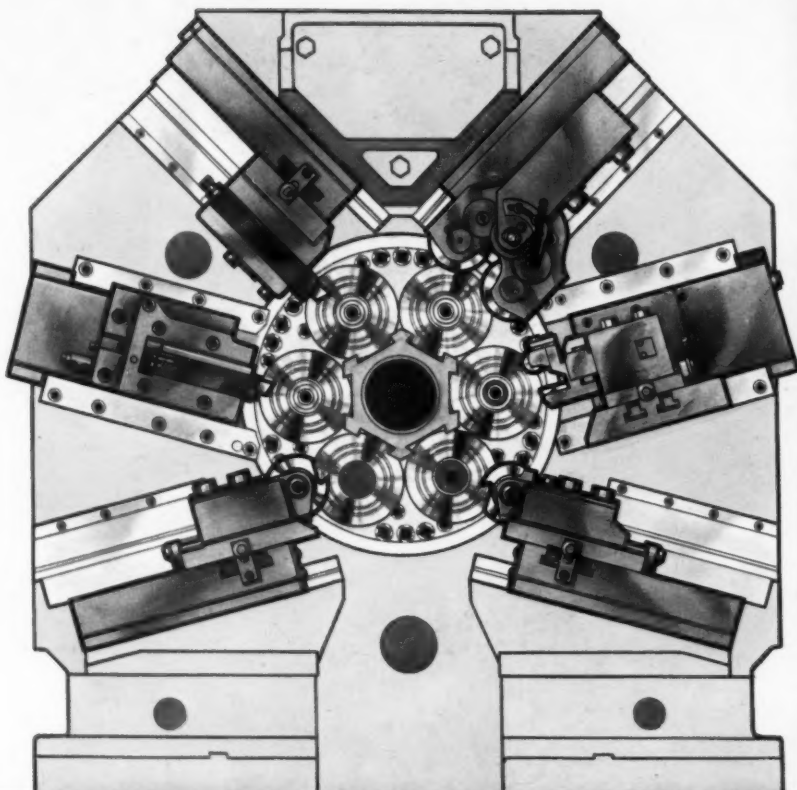


All the ruggedness of a cross slide,  
 but with two-way motion for cut-  
 ting O.D.'s, I.D.'s, tapers and radii  
 and for recess boring, in addition to  
 facing cuts. New Britain-Gridley  
 Machine Division, The New Britain  
 Machine Company, New Britain,  
 Connecticut.

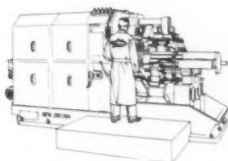
Look at New Britain's  
**new cross slide  
arrangement**



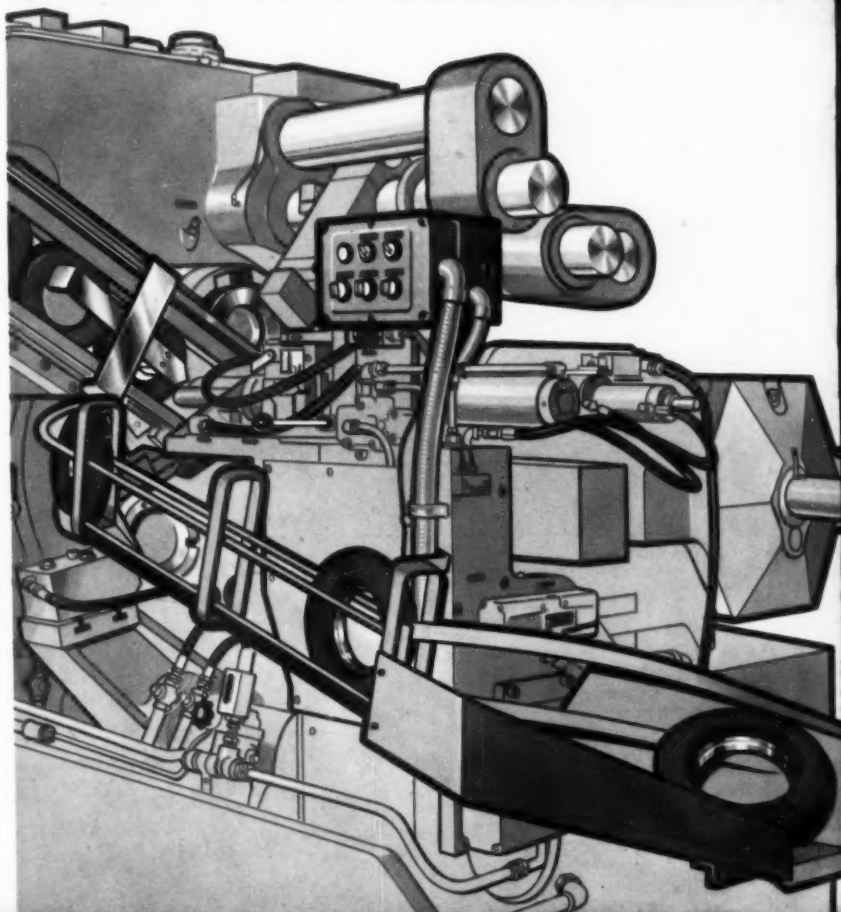
Independent radial cross slides in *all* positions, providing maximum clearance for more cross slide operations.

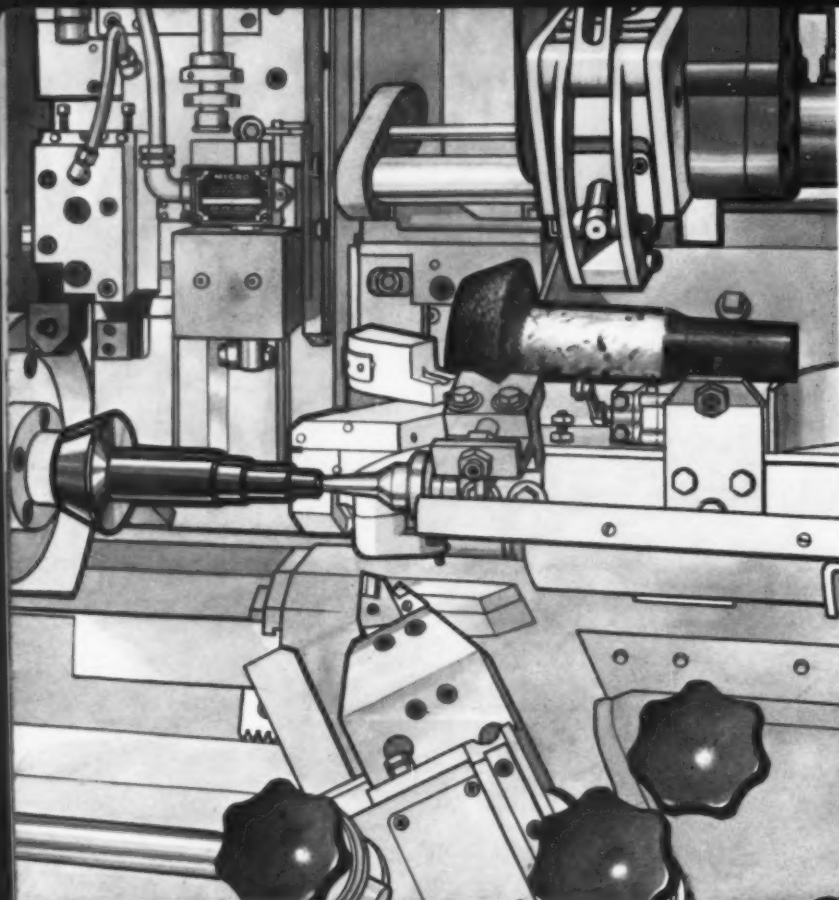


Look at New Britain's  
**open-end  
chucker design**



Greater accessibility for all applications and particularly well adapted to automatic handling of pieces. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

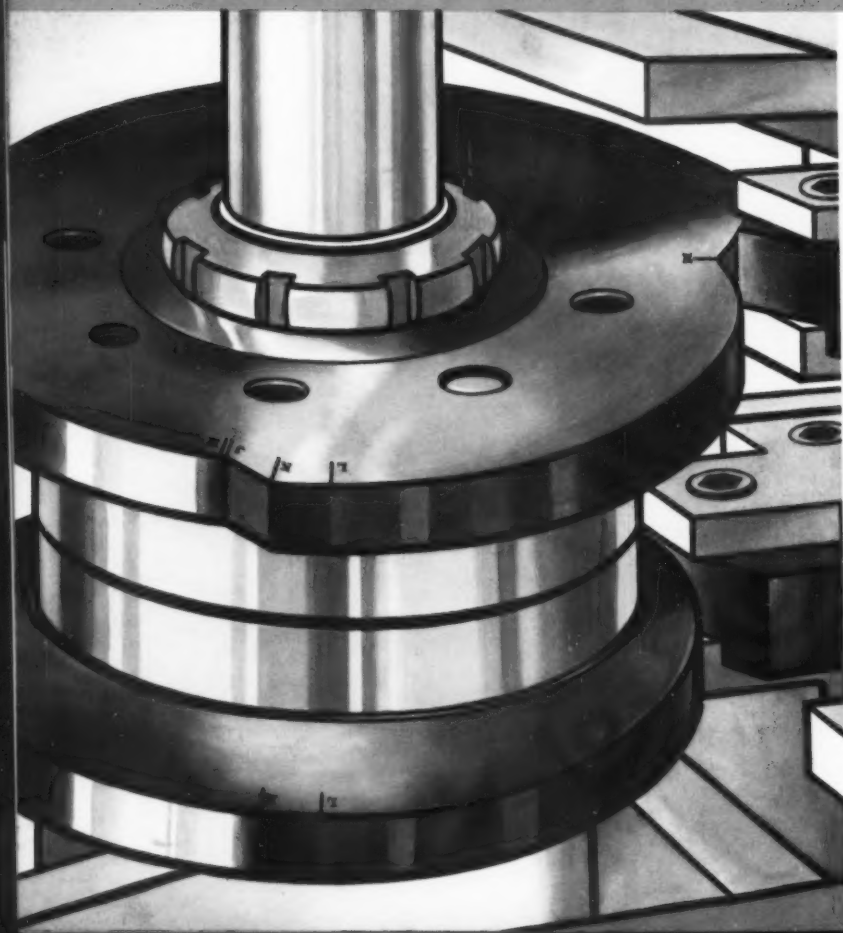




*Look at*  
*Automatic Loading on*  
**New Britain +GF+**



This basic optional feature can make money for you whether you are working with forgings, bar slugs, or bar stock.



*Look at New Britain's*  
**cam-controlled**  
**boring machine**

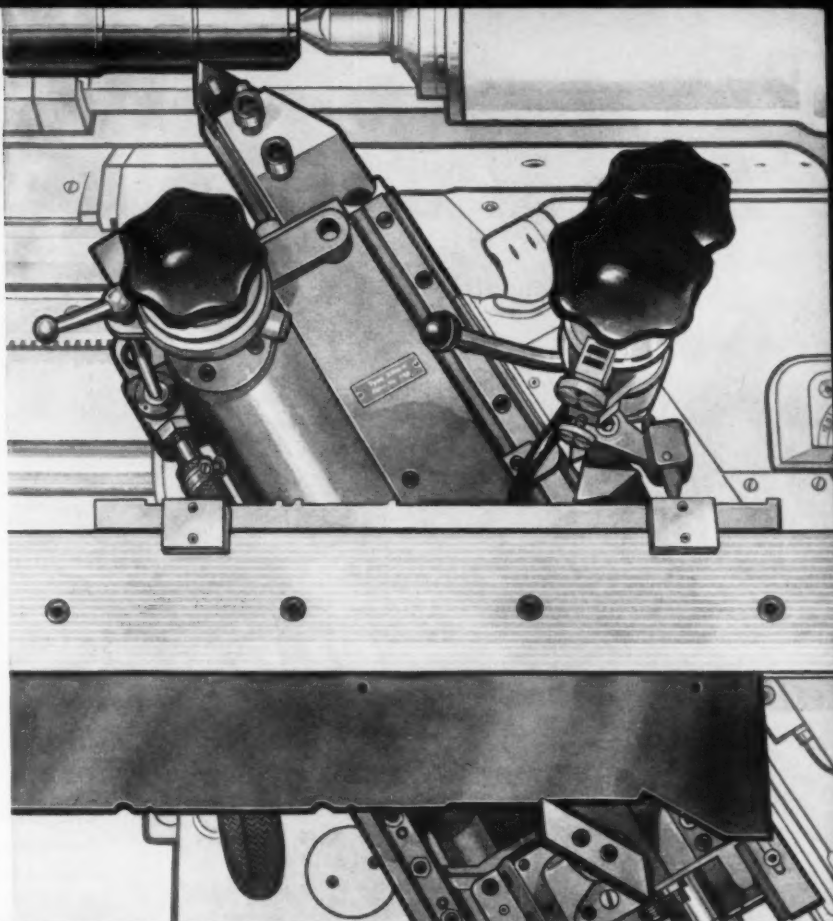


When you are working to tenths there is no substitute for the positive tool control that only precision cams provide. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

*Look at*  
**Single Point Tooling on**  
**New Britain +GF+**



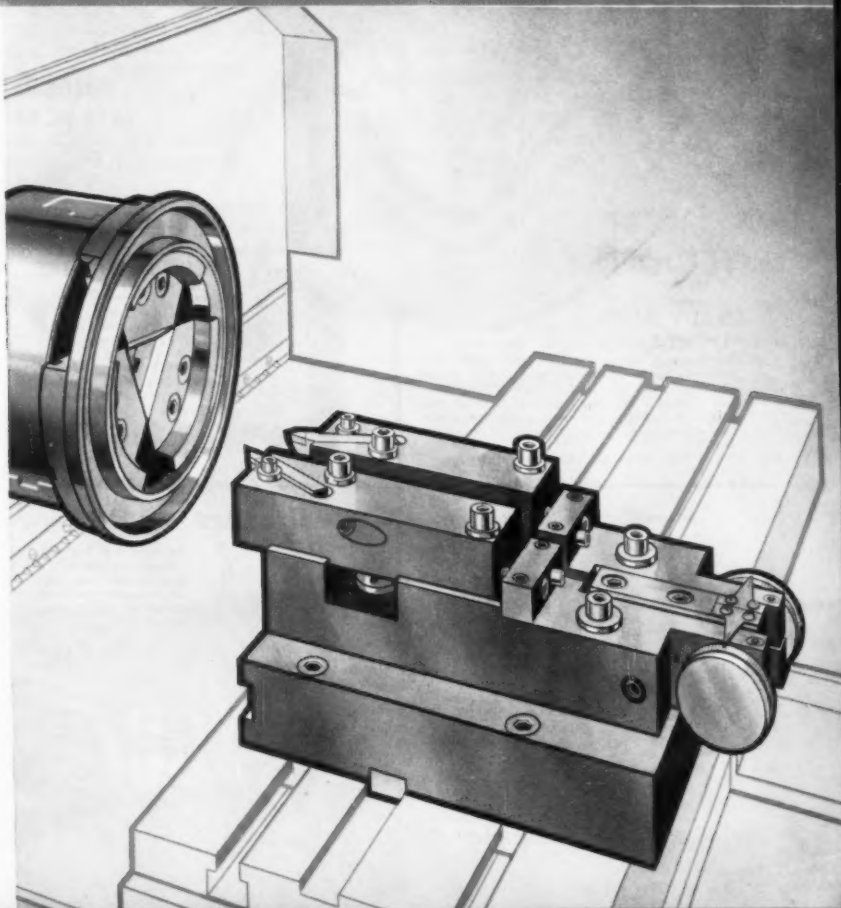
Outproduces gang tooling setups by reducing tool change time practically to zero, and by cutting at maximum speeds and feeds for tool efficiency.



*Look at New Britain's*  
**simple approach**  
**to problem pieces**



Low cost per piece is inherent in New Britain Precision Boring Machines because of their simplicity, versatility, speed, repetitive accuracy and inexpensive tooling. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.





# ARMSTRONG

## Drop Forged CLAMPS



### LEADERS IN THE DROP FORGED CLAMP FIELD

... in design, machining and strength; in completeness of line in both sizes and types.

Designs are based on a full knowledge of clamp uses and requisites. Drop forging assures die-perfect form, texture toughness and freedom from structural faults. Maximum stiffness is attained by a discerning selection of steels with accurate controlled heat-treating, tempering and testing.

For dependability and long useful life, specify and standardize on ARMSTRONG Drop Forged Clamps.

### EXTRA DEEP THROAT "C" CLAMPS

Provide extra clearance required for some work. Extremely stiff for weight. Screws and hubs are accurately machined and aligned with machined seats; have sliding pin handles and free-acting swivel caps on point. Bodies have smooth sandblast finish. (8 sizes to 12" opening)



### HEAVY DUTY "C" CLAMPS

Universally recognized as strongest "C" clamps made. Longer hub holds screw alignment against terrific side strain; permit tighter clamping and multiplies thread friction against loosening. Extra large screws are heat treated and hardened at point. (11 sizes to 12 3/4" opening)

Write for new ARMSTRONG General Catalog showing almost 5000 industrial tools.



### ARMSTRONG BROS. TOOL CO.

5213 W. ARMSTRONG AVE. • CHICAGO 30, U.S.A.

### MEDIUM SERVICE "C" CLAMPS

The design and careful selection of steels in this type clamp combine to give it maximum strength and stiffness consistent with convenient weight. Heat treated screw with sliding pin handle and swivel cap on point. Ground seat. (9 sizes to 18" opening)



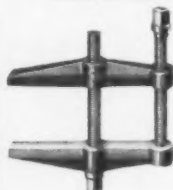
### TOOL MAKERS "C" CLAMPS

Quality steels, drop forged, heat treated and accurately machined with ground seats. Drop forged screws have both "wing nut" handle for convenience and square necks for tight setting with a wrench. Either "plain" or "swivel" screw types. (Four sizes: 1", 2", 3" or 4" maximum opening)



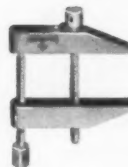
### MACHINISTS' CLAMPS

Jaws drop forged, carefully machined and hardened, are extra heavy; will not bend or spring on a short bite and are faced true. Will grip non-parallel surfaces because the under face of the center screw is convex, fitting into a concave seat for tilting. (Four sizes: Capacities to 4 1/4" opening)



### PARALLEL CLAMPS

Carefully machined from selected grade steel and hardened. Particularly suited for holding work together when drilling or tapping. Rounded jaw ends increase clearance in close quarters. Spring clip holds loose pin in alignment while tightening or loosening. (3 sizes: Capacities to 2 1/4" opening). (Not Drop Forged)

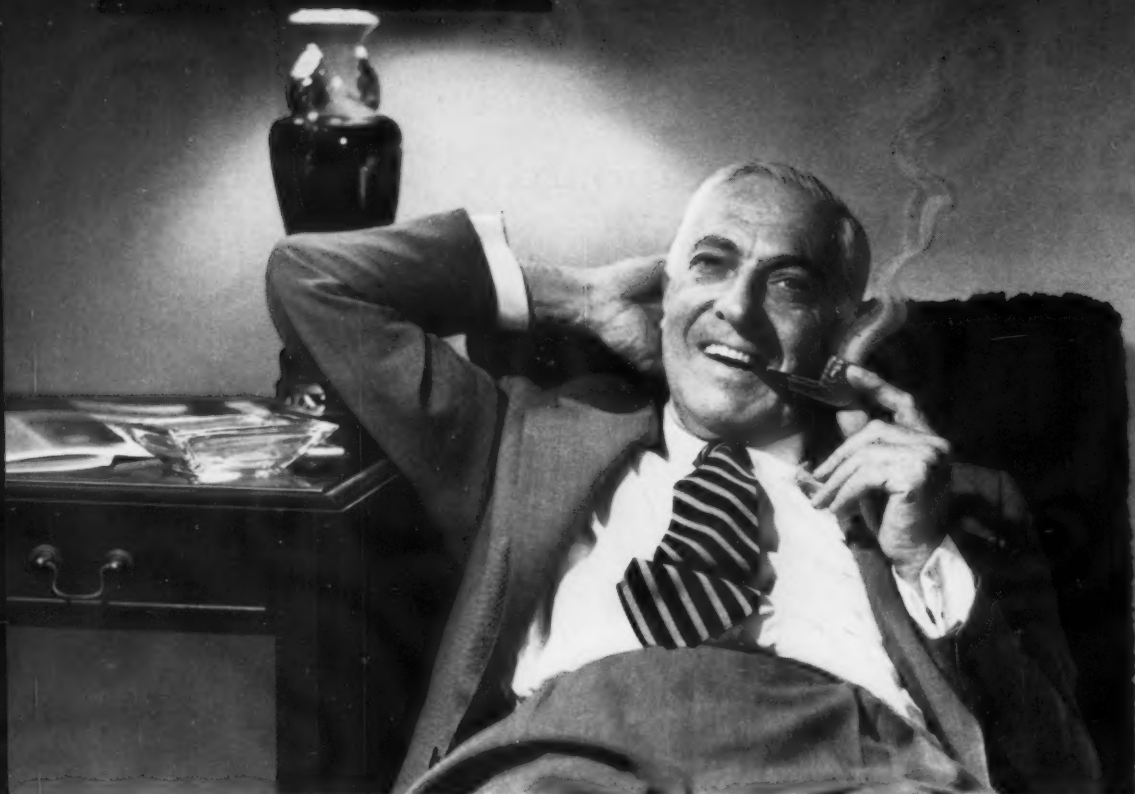


### SPATTER RESISTANT WELDERS "C" CLAMPS

Extra Deep Throat Pattern (see above). Body, Swivel and Screw are cadmium plated over all to resist welding spatter. (8 sizes Capacities to 12" opening)







## How to Relax

If you're all tied up in knots over the high cost of operations, there's an easy way for you to break the tension. Put CIMCOOL® to work in your plant and dreams of increased production and lower costs will become realities. You'll relax with the knowledge that CIMCOOL Concentrate is taking care of your cutting fluid problems. Here's why:

- **CIMCOOL LOWERS COSTS** because it's longer lasting in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.
- **CIMCOOL DOES A BETTER JOB** because of its chemical lubricity. It permits faster speeds and feeds, for it combines friction reduction and cooling capacity in a degree never before attained by old-fashioned coolants.
- **CIMCOOL IS CLEAN**, doesn't soil clothing or hands. It contains no skin irritants. It leaves no slippery film on shoes, floors, machines or work. It can't smoke, can't burn, and virtually eliminates rancidity and foul odors.

There's no need to send up smoke signals. Simply phone your CIMCOOL Distributor. He'll give you complete information on CIMCOOL Concentrate—and the entire family of CIMCOOL Cutting Fluids.

Or contact us direct. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

® Trade Mark Reg. U.S. Pat. Off.

### CIMCOOL CUTTING FLUIDS

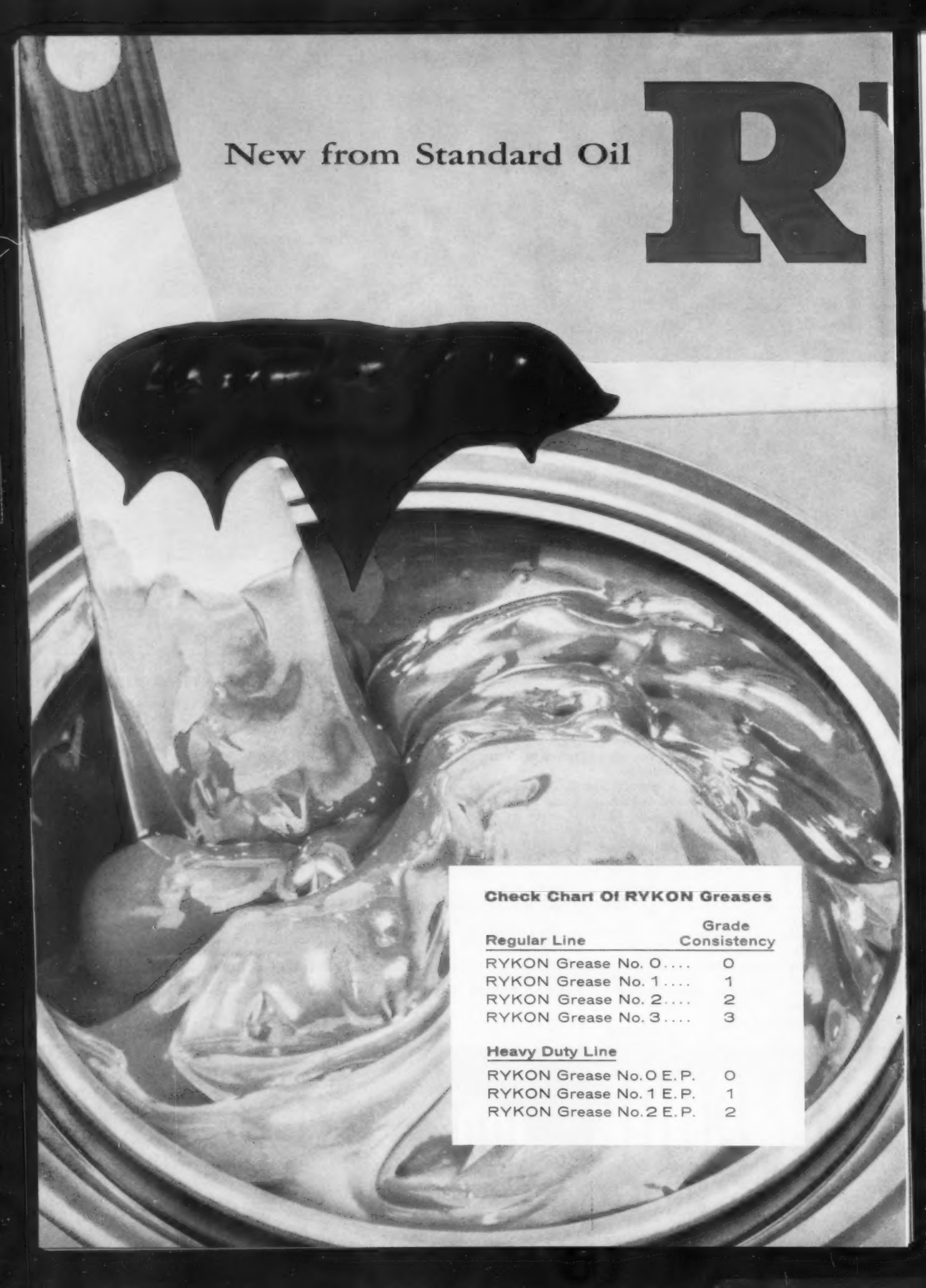
- CIMCOOL Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.
- CIMCOOL Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.
- CIMPLUS** The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.
- CIMCUT Concentrates** — For jobs requiring oil-base cutting fluids. Added to mineral oils, they give economical mixes for higher speeds and feeds.
- CIMCOOL Bactericide** — The most effective agent yet developed to overcome rancidity and foul odors.
- CIMCOOL Machine Cleaner** — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

# CIMCOOL

## Cutting Fluids

*for 100% of all metal cutting jobs*

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.



New from Standard Oil

**R**

**Check Chart Of RYKON Greases**

| <u>Regular Line</u>    | <u>Grade<br/>Consistency</u> |
|------------------------|------------------------------|
| RYKON Grease No. 0.... | 0                            |
| RYKON Grease No. 1.... | 1                            |
| RYKON Grease No. 2.... | 2                            |
| RYKON Grease No. 3.... | 3                            |

**Heavy Duty Line**

|                         |   |
|-------------------------|---|
| RYKON Grease No. 0 E.P. | 0 |
| RYKON Grease No. 1 E.P. | 1 |
| RYKON Grease No. 2 E.P. | 2 |

# RYKON

GREASE



*Standard scores major breakthrough in grease technology to bring you better lubrication...help you make important savings in grease use, application and inventorying.*

Scientists at Standard Oil, after several years' research, have developed a new non-soap, organic grease thickening agent. This new thickening agent, plus other improvements in grease formulation, is now available in a new line of Standard Oil greases named RYKON. RYKON Greases have all of the desirable properties of the finest quality greases—but to a greater degree. Here are data on the characteristics of RYKON Greases:

**Mechanical stability**—RYKON Greases show minimum change in consistency under severe mechanical working...do not thin out excessively in service.

**Oxidation stability**—Thickener in RYKON Greases inhibits the absorption of oxygen which prevents free movement, results in bearing corrosion.

**Water resistance**—RYKON Greases do not lose consistency in presence of water. Resist water washout.

**High temperature stability**—RYKON Greases have an ASTM dropping point of over 480° F. They have greater heat stability than other petroleum oil greases. At sustained high temperatures, RYKON Greases remain soft and grease-like longer. High temperature range permits the broadest possible application.

**Oil separation**—There is a minimum bleeding of RYKON Greases in service and in storage.

**Wide temperature range**—Ability of RYKON Greases to lubricate over a wide temperature range makes them truly multi-purpose greases.

**Rust preventive properties**—RYKON Greases demonstrate a superior ability to prevent rust.

RYKON Greases are multi-purpose. To meet specific grease lubrication problems, they are formulated in four regular and three heavy duty grades. There is a RYKON Grease to meet every lubrication problem.

With a single RYKON multi-purpose grease doing all jobs in the plant, there's no wrong grease to use. Money invested in grease inventories is cut, storage and application facilities are reduced and maintenance training is simplified. Get the facts about RYKON Greases from the industrial lubrication specialist in the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

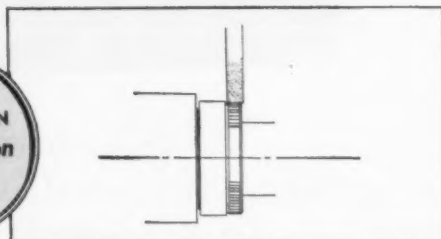
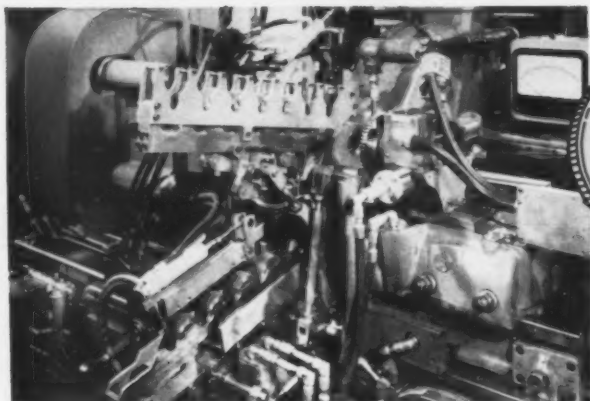


**STANDARD OIL COMPANY (Indiana)**

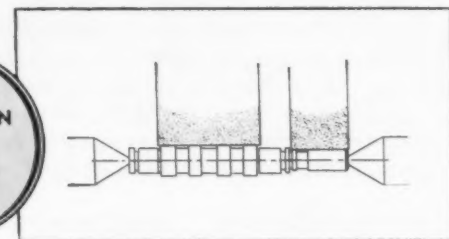
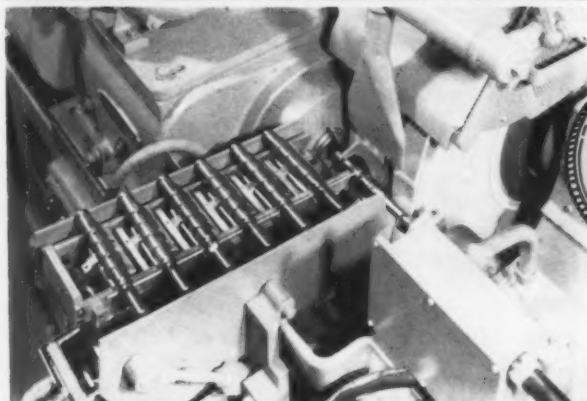
# The more you grind the more you save with Norton...



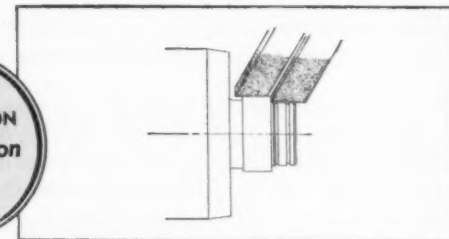
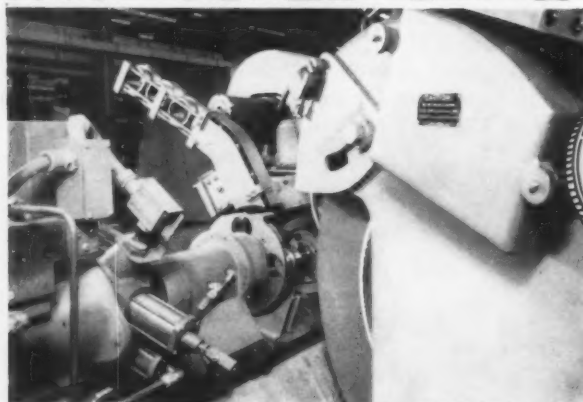
## Typical automatic features on Norton grinders



In a Type CTU Cylindrical Grinder arranged for completely automatic loading, grinding, and unloading of transmission gears, the part is held on a chuck and grinding cycle is terminated by an automatic air-electric grinding gage that signals when work is to size.

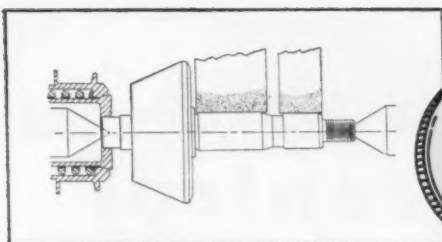


When a Type CTU Grinder is arranged for fully automatic loading and grinding of valve pistons the part is held on centers and driven by a floating type collet. Work is ground by a double-wheel mount.

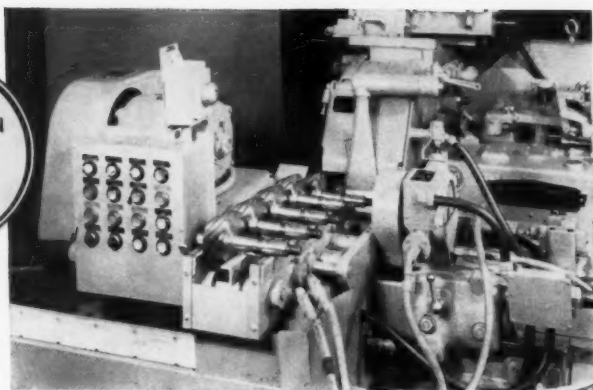


On this Type CV-4 Angular Wheelslide Grinder chucked grinding of transmission sleeves is arranged in a completely automatic cycle. Longitudinal movement of a revolving turret loads the machine. A stripper type plate removes the piece when turret retracts as the grind is terminated by electrically timed control.





SAVINGS ON  
Stem  
Pinions



The Stem Pinion Grinder reduces time and effort with a completely automatic cycle, electrically timed arrangement for grinding these hard-to-handle parts. Progressive escapements in the automatic loading mechanism release the parts in succession, avoiding gear mesh.

**NEW ECONOMY!**

## Norton No. 2 Unitized Transfer Grinder Grinds Crankpins Automatically

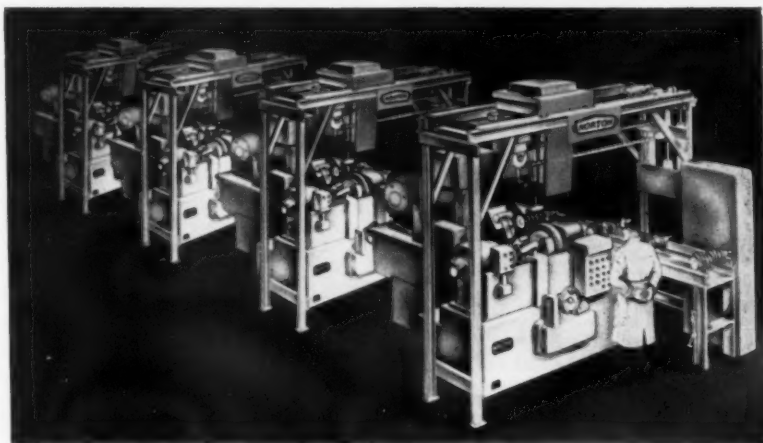
Here's a newly developed machine that automatically grinds crankpins faster and for less money than ever before possible. Advanced features like the following are reasons why:

**Unitized Operation.** Each grinding station, operating independently, can be automatically by-passed without affecting continuous production.

**New Transfer Mechanism.** Double set of hooks speeds loading, unloading and transferring of crankshafts from one grinding unit to another.

**Fast Production.** Cycling grinds 240 crankpins on 60 V-8 crankshafts per hour, due to many automatic operations.

**Only One Operator Needed.** Others are freed for different jobs. And the machine reduces floor-space requirements.



Norton has developed a wide range of fast, automatic grinders. You can get them in conventional and angular wheel-slide types — also in special types for grinding automotive valve faces and crankshaft pins.

*Remember: only Norton offers you such long experience in both grinding machines and wheels to bring you the "Touch of Gold" that helps you produce more at lower cost.*

For further information about these machines — including how the No. 2 Unitized Transfer Crankpin Grinder can save you many dollars daily — contact your Norton Representative. Or write to NORTON COMPANY, Machine Division, Worcester 6, Mass.

District Offices:

Worcester • Hartford • Cleveland • Chicago • Detroit

For more information fill in page number on Inquiry Card, on page 221

To Economize, Modernize with NEW

# NORTON

GRINDERS and LAPPERS

*Making better products...  
to make your products better*

**NORTON PRODUCTS:**

Abrasives • Grinding Wheels • Grinding Machines • Refractories

**BEHR-MANNING DIVISION:**

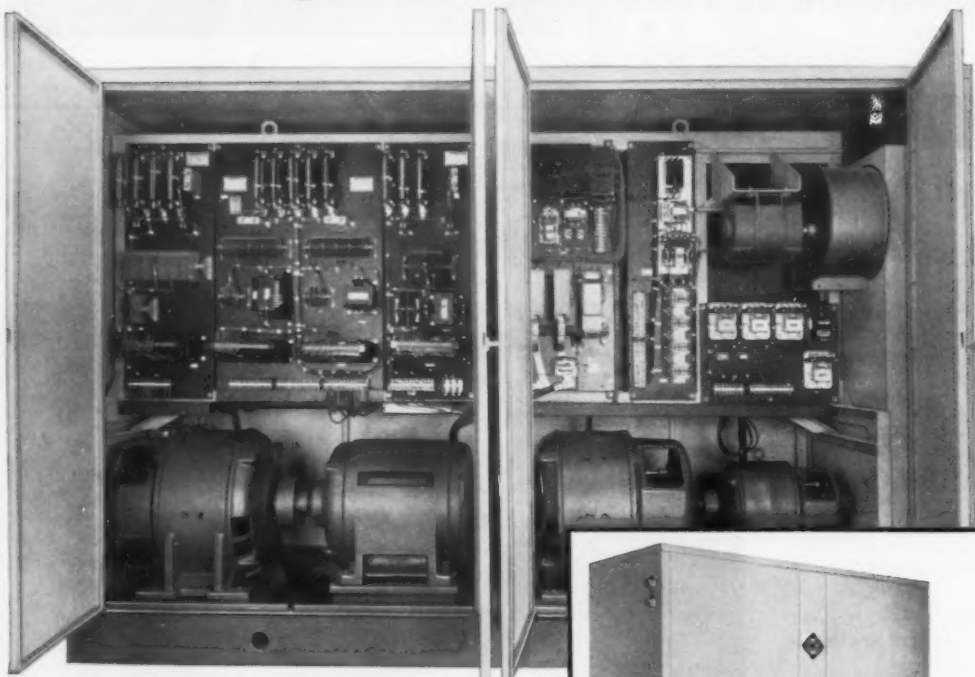
Coated Abrasives • Sharpening Stones • Behr-cat Tapes

MACHINERY, November, 1957—39

There's  
**MORE**

# dependable speed control

- high response
- no fragile parts
- high shock resistance
- no maintenance



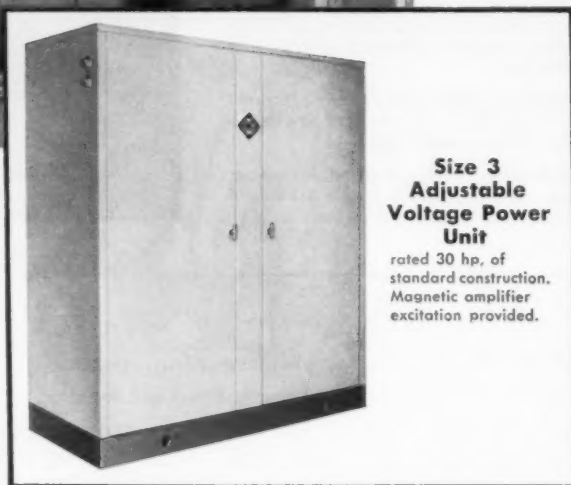
**Adjustable Voltage Multi-Motor Package Drive** is ideal for many industrial applications. Self-ventilation keeps unit clean, minimizes maintenance.

Every one of the design features of the Allis-Chalmers Adjustable Voltage Package Drive assures you an easy, dependable means of power conversion.

Key to Package Drive dependability is the use of a magnetic amplifier to excite the field of the power unit m-g set. Sturdy and simple, this amplifier has no moving parts to wear out... no fragile components to be affected by vibrations. AND — there's no wasteful "warm-up" time needed. At the turn of a dial, you get immediate speed control.

## Cost-saving assembly

M-g set and control components are assembled in the power unit enclosure at the factory — saving you installation costs. Enclosures used for 30 through 200-hp units are completely collapsible and may be easily disassembled without loss of rigidity. Larger units



**Size 3  
Adjustable  
Voltage Power  
Unit**

rated 30 hp, of standard construction. Magnetic amplifier excitation provided.

have separately driven blowers to provide positive ventilation and pressure even when unit is idle.

Available in units from 5 to 200 hp, the package drive is ideal for any application requiring adjustable speed. Contact your nearby Allis-Chalmers sales office or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

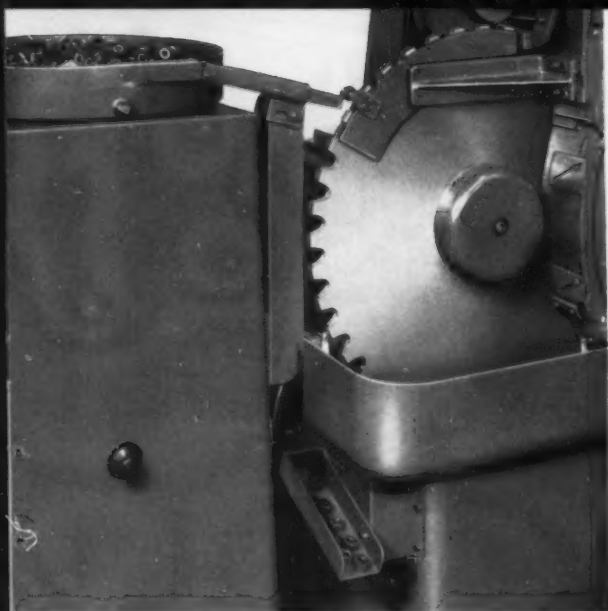
# ALLIS-CHALMERS



A-5270



## Gardner 2H30 disc grinds 2000 pinion gears per hour ... automatically



*Vibrator type feeder with transfer attachment*

grinds **TWO** parallel sides in **ONE** operation ...

### machine equipment

automatic swinging arm dresser  
automatic gaging  
wet grinding system  
vibrator type feeder with transfer attachment  
notched rotary carrier with chain hold-down  
magnetic coolant separator

### production data

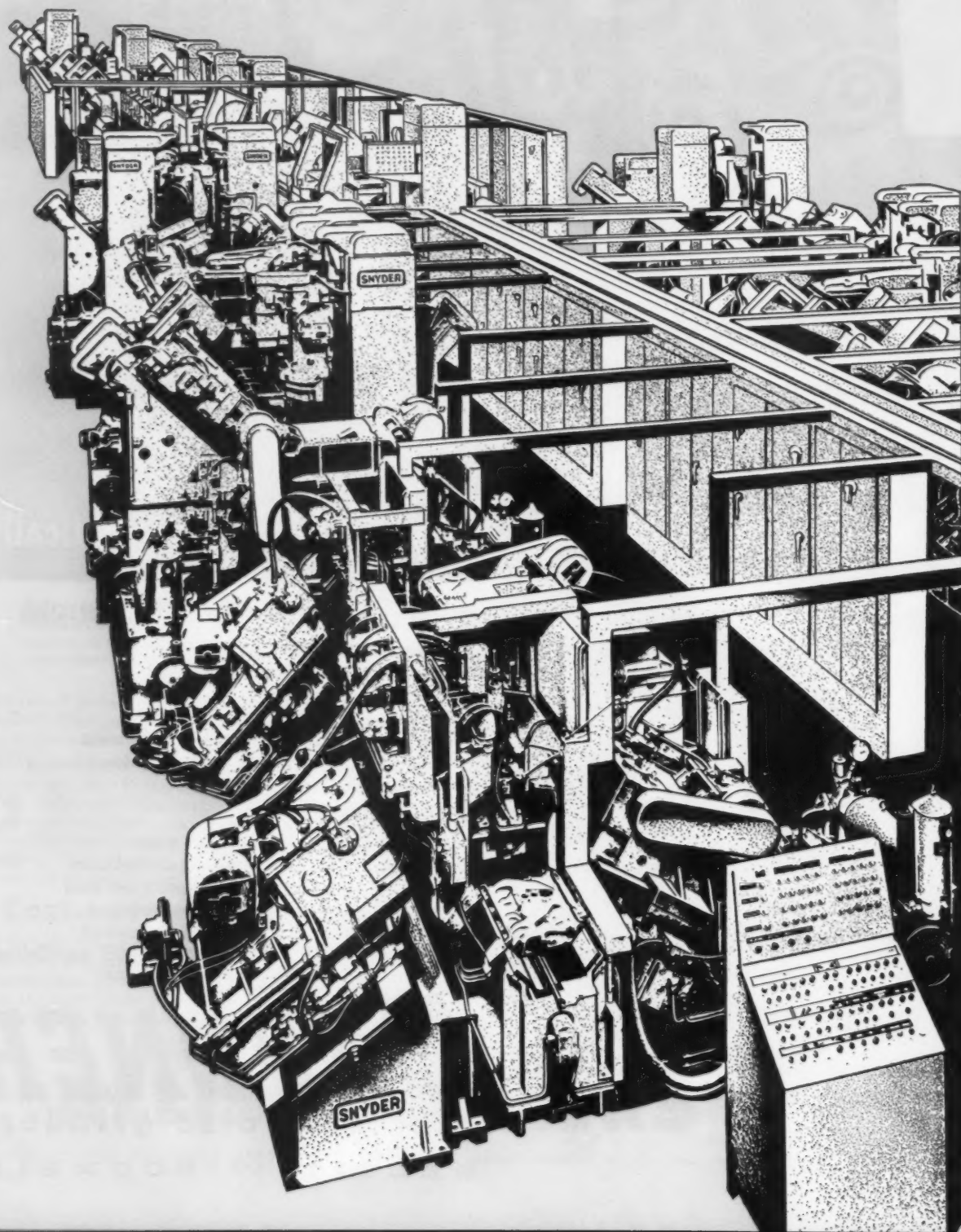
|                |   |
|----------------|---|
| Part:          | pinion gear                                       |
| Operation:     | grind parallel sides                              |
| Rate:          | 2000 parts per hour                               |
| Material:      | heat treated steel                                |
| Stock Removal: | .010" max. overall                                |
| Tolerances:    | .0002" to .0003" parallelism<br>.0015" uniformity |

# **GARDNER**

**precision disc grinders**

BELOIT, WISCONSIN

# **Unique Combination of Snyder Special Two or Four Barrel Intake Manifold**



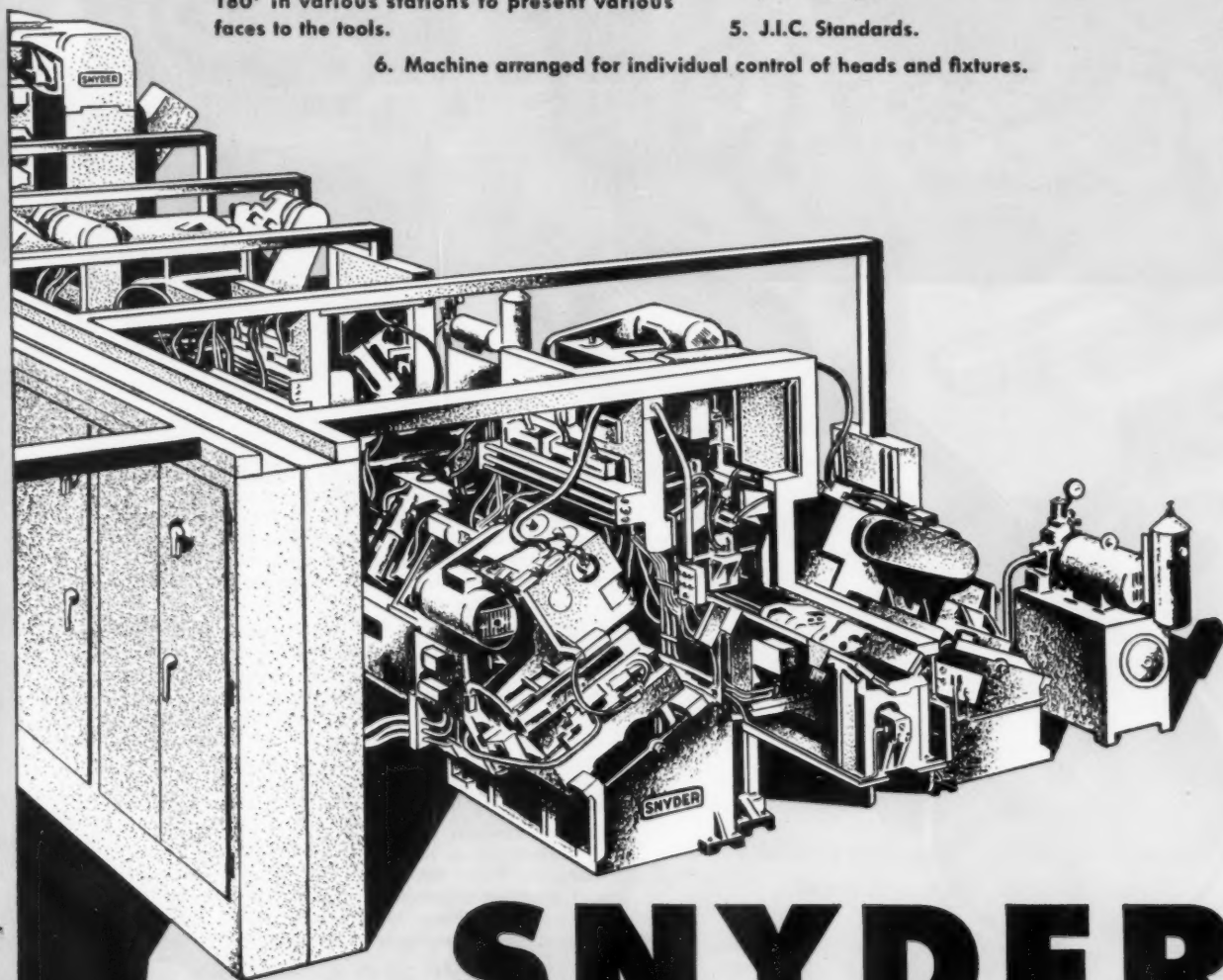


# Transfer Machines Processes Either Castings from Rough to Finished Parts

Combination of two special transfer milling machines in parallel, with automation, feeding into one special transfer drilling machine gives production of 136 pieces per hour

## Special Features of Snyder Machines Nos. 55-60 and 55-61

1. Machine line handles two or four barrel manifolds, random intermixed; sensing devices automatically instruct the proper drilling and tapping units.
2. Part rotated vertically 180° and horizontally 180° in various stations to present various faces to the tools.
3. Individual electrical panels and hydraulic units for each segment.
4. Wing bases, sections, spacers and risers stand-ard throughout for easy adaptation to future part changes.
5. J.I.C. Standards.
6. Machine arranged for individual control of heads and fixtures.

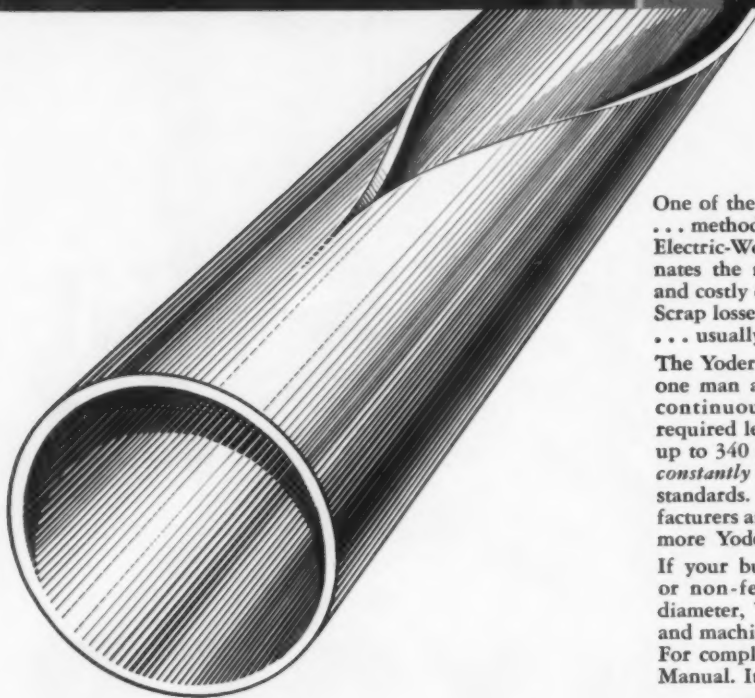
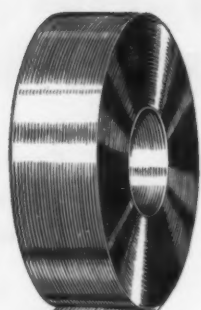


# SNYDER

TOOL & ENGINEERING COMPANY  
3400 E. LAFAYETTE • DETROIT 7, MICHIGAN

*32 Years of Special Machine Tools with Automation*

**from cold strip to finished tubing  
IN SECONDS!  
with a YODER  
ELECTRIC-WELD TUBE MILL**



One of the fastest . . . and one of the least expensive . . . methods of making steel tubing is with a Yoder Electric-Weld Tube Mill. The Yoder method eliminates the need for time-consuming heat treatments and costly conditioning furnaces for most tube needs. Scrap losses, too, are far lower than any other method . . . usually less than 2%.

The Yoder Type-M Mill shown above is operated by one man and a helper. Coiled strip on this mill is continuously cold-roll formed, welded and cut to required lengths in a matter of seconds . . . at speeds up to 340 f.p.m. The quality of the resulting tube is *constantly* better than the requirements of commercial standards. This is one of many reasons why manufacturers and users of tubing the world over are using more Yoder mills than all other makes combined.

If your business requires pipe and tubing, ferrous or non-ferrous, in sizes from 1/4-inch to 26-inch diameter, Yoder can supply the engineering service and machines to produce it faster and better for less! For complete details, write for the Yoder Tube Mill Manual. It's yours for the asking.

**THE YODER COMPANY**  
5504 Walworth Avenue • Cleveland 2, Ohio



**PIPE AND TUBE MILLS (ferrous or non-ferrous)**

**COLD ROLL FORMING MACHINES**

**ROTARY SLITTING LINES**



# Jacobs

## CHUCKS

Grip and accuracy are the products of perfectly made and matched parts.

Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.

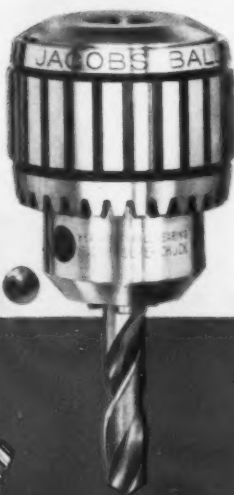
**The Jacobs Manufacturing Company  
West Hartford, Connecticut**



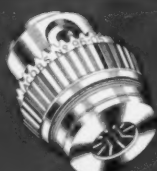
The Jacobs Model 91 Spindle Nose Collet Chuck for tool room and engine lathes.



The Jacobs Rubber-Flex® Tap Chuck designed for tapping heads and impact tools.



The Jacobs Ball Bearing Super Chuck for heavy duty and precision industrial use.



The Jacobs Model 96 Collet Chuck for grinding machines, millers and jig-borers.



The Jacobs Impact Keyless Chuck especially designed for the aircraft industry.



The Jacobs Plain Bearing Chuck for drill presses, portable electric and air tools.

# ALL

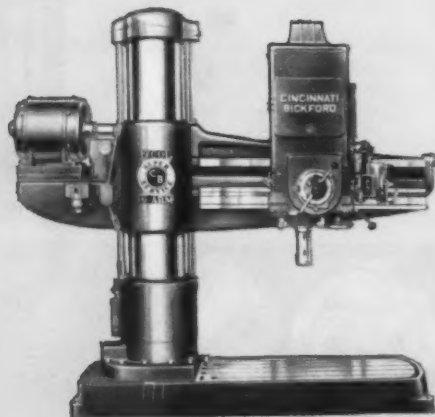
# NEW

**CINCINNATI  
BICKFORD**

*Lever  
Shift*



- Exclusive HERRINGBONE drive—the only radial built with this advanced feature.
- Pre-loaded, four-bearing spindle and chromium plated sleeve.
- Hydraulic arm and column clamping, special separate motors and complicated electrical controls are **ELIMINATED!**
- A positive lock-out of the power feed is available. When plunger is operated, it guards against accidental engagement of power feed during tapping or reaming.
- Head-moving handwheel is **DE-CLUTCHED** when head is traversed by power. Possible operator injury is completely eliminated.
- Two sealed-beam work lights, one on each side of spindle, never get hot ... Impervious to damage from chips and coolant.
- 36 speeds up to 2300 rpm, 18 feeds including 6 geared tap leads.





**CINCINNATI BICKFORD**

# Super Service Radials

MODERN DESIGN and latest engineering developments built in the ALL-NEW Super Service Radial drilling machines give you *higher production . . . faster, safer operation . . . and greater machining accuracy*. Here are a few of the reasons why:

Exclusive de-clutchable HERRINGBONE DRIVING GEAR provides the necessary power to drive large diameter drills and heavy cutting tools for maximum penetration. When higher speeds are used, such as for small taps, the herringbone driving gear is de-clutched, eliminating excessive velocity.

Three head designs available—*lever shift control of all 36 speeds and 18 power feeds; complete hydraulic pre-selection of speeds and feeds; hydraulic pre-selection of speeds only*—manual control of power feeds.

A positive safety device is provided in the head traverse mechanism to guard against damage should the head strike the workpiece or other objects during traverse. This safety functions *at any point of head travel on arm*. Head-moving HAND-WHEEL DOES NOT REVOLVE when head is being traversed by power.

A pre-loaded, four-bearing, chrome nickel spindle and chromium plated sleeve . . . supported in a *honed head bore over 17" long* . . . assure maximum spindle rigidity, *regardless of position*.

The ALL-NEW Super Service Radials are available with 13", 15", 17" and 19" dia. columns, and 4, 5, 6, 7 and 8-ft. arms. For complete specifications on these powerful radial drilling machines, see your nearest Cincinnati Bickford sales representative.



## CINCINNATI BICKFORD DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO.

CINCINNATI 9, OHIO

*Radial Drilling Machines, Upright Drilling and Tapping Machines, Upright Gang Drilling Machines, and Precision Production Drilling Machines designed for use with spacing table.*



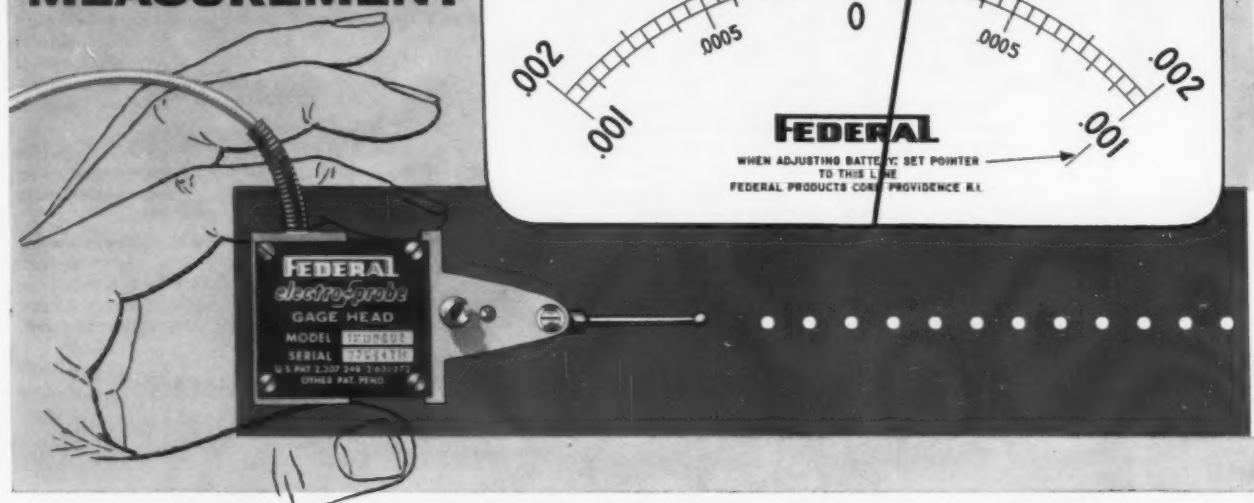
*Partial  
Pre-Select*



*Complete  
Pre-Select*

For complete specifications concerning Super Service Radials, ask for Bulletin No. R-35.

## NEW FREEDOM IN PRECISION MEASUREMENT



## New, Lower Cost Method of Electronic Gaging Promises New Horizons in Dimensional Control

### as a system of measurement

The Electro-Probe system is one of far reaching capabilities . . . the gaging signal maintains exact linear relationship to contact movement — so exact, in fact, that available electrical instruments have not had sufficient sensitivity to measure the error. And this precision is available over the exceptionally wide range of .060". Mechanical and electrical sensitivity of the Electro-Probe is capable of providing magnifications and accuracies which will more than meet even *tomorrow's* precision

gaging requirements. Small size and extremely light gaging pressure enable the gage head to reach and explore hitherto inaccessible surfaces. Hermetic sealing also allows you to use the Electro-Probe under conditions where electronic gaging has previously been impractical. Thus, the Electro-Probe has a challenging reserve of capability awaiting the need and means for its use. Perhaps you have an application that needs the Electro-Probe's advantages. We'll be glad to discuss it with you.

### as a precision instrument

The first publicly announced application of the Electro-Probe system is the Model 230 P-2 Electronic Test Indicator described on the facing page. It is far more than just another electronic test indicator. No need for special stands or holding fixtures. No need for external power.

No voltage fluctuation or warm-up problems. No need for close gage head positioning during set-up. The Electro-Probe frees you from these and other restrictions of use — truly provides you with a new freedom in precision measurement.

Ask **FEDERAL** First

FOR RECOMMENDATIONS IN MODERN GAGES . . .

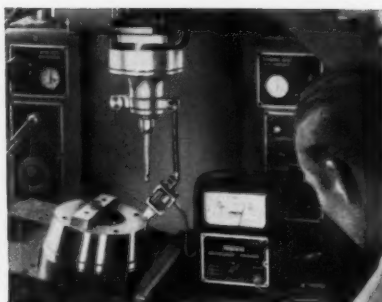
Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging



**Surface Plate** — Electro-Probe can be used accurately with any type of conventional test set.



**Bench** — Use the Electro-Probe on any suitable comparator.



**Machine** — The light contact pressure of the Electro-Probe makes machine set-ups easier and faster.

# ... the **electro→probe**

**1. TAKE IT ANYWHERE** — The Model 230 P-2 Electro-Probe, a part of the new Electro-Probe System, is a completely portable, self-contained unit consisting of a bantam size electronic gage head and transistor amplifier which together with metal carrying case and accessories weighs only 8½ lbs. It is completely independent of external power. Gage head and output cord are impervious to oil and water in any amount (electrical parts are hermetically sealed).

**2. MOUNT IT ON ANY CONVENTIONAL FIXTURE** — The Electro-Probe gages accurately without requiring a special stand or holding fixture because it has the lightest positive gaging pressure (less than 5 grams). Posts and arms which would deflect even under normally light gaging pressures remain rigid when the Electro-Probe is used. And unlike other precision instruments, gaging pressure is constant throughout range (change is less than 0.1 gram per .001").

**3. SET IT UP IN A JIFFY** — The Electro-Probe gives you precision *without* the penalty of time-consuming, finicky adjustments. Master it anywhere within its range because Electro-Probe response is absolutely linear. Full scale Zero Adjustment makes positioning easy and fast. Also — unlike any other electrical gaging device, warm up time is virtually zero. Gage the part when *you're* ready, turn it on and off, as you like, without penalty.

**4. GAGE WITH EASE AND ASSURANCE** — The Electro-Probe contact has friction-free travel of .060". It is clutch mounted so you can place head in almost any position — as well as to provide *complete* over-travel protection. Either of two magnifications instantly available by switching. Wide 4½" dial provides comfortably spaced, easy-to-read graduations. Knife-edged pointer permits sharply defined readings.

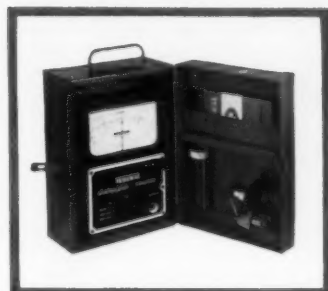
**5. ENJOY GREATER RELIABILITY THAN EVER BEFORE** — Use of printed circuits and transistors in Electro-Probe Amplifier means truly trouble-free operation. Connections are sure, operating current amazingly low, — no heating or voltage regulation problems, no dependence on electrical outlets. Learn more about this truly portable, reliable, accurate and versatile gaging device that gives you precision without the restrictions that precision has up to now imposed.

Write for literature

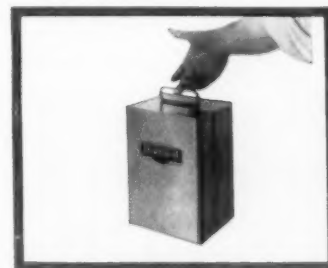
Federal Products Corporation, 71111 Eddy Street, Providence 1, R. I.

For more information fill in page number on Inquiry Card, on page 221

## Packaged for Convenience



Electro-Probe gage head, self-powered amplifier, and accessories, all in one light-weight case.

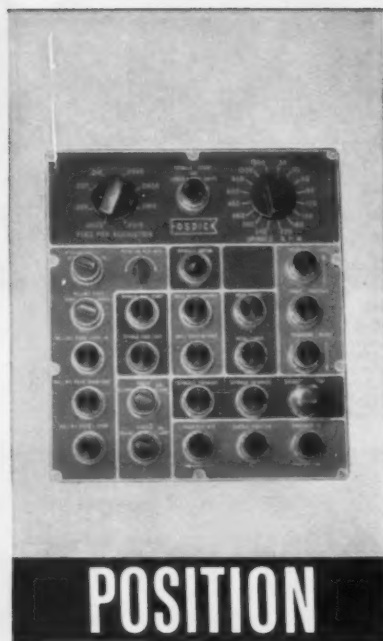


... easily carried from job to job.



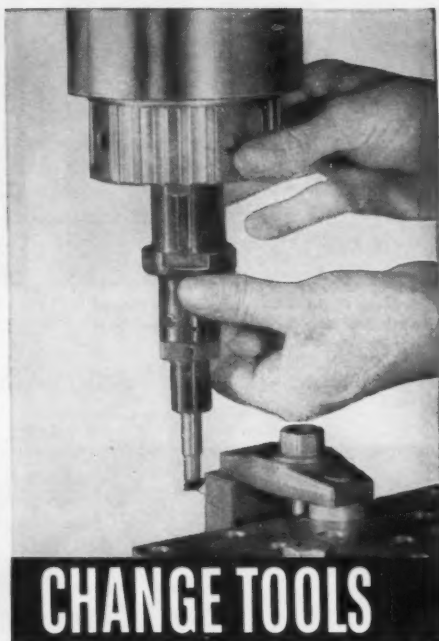
## MEASURE

*Dial dimension direct from print.* There are two sets of direct-reading drum dials, one for longitudinal, the other for transverse position. Operator simply sets dials so that numbers on dials correspond with numbers on blueprint. Simple. Direct. Precise.



## POSITION

*Press two buttons, one for longitudinal, one for transverse positioning.* Table, and work, are automatically positioned, and clamped under the tool, accurate to  $\pm .0001$ ! Accuracy is dependent upon highest-quality gages, not upon screw threads. Sensitive .0001 Dial Indicators maintain a positive check at all times.



## CHANGE TOOLS

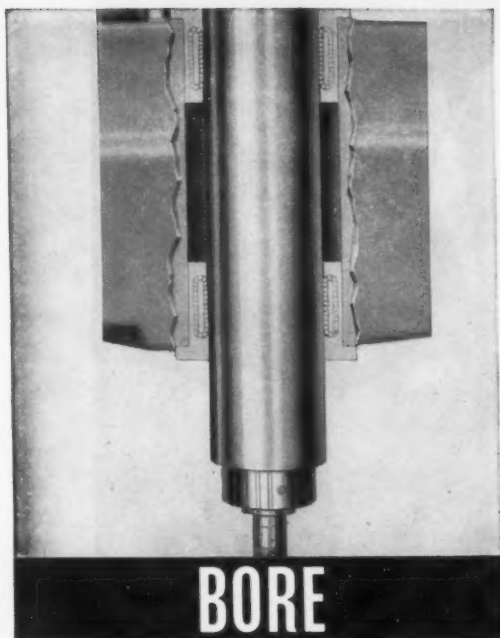
*Tool changing takes less than 10 seconds, with BF spindle.* Can be accomplished while table is positioning. Hole sizes are repeated within  $\pm .0001$ ", without re-setting tools! High-precision tool holder is built right into the spindle of the Jig Borer. Adapters accommodate both standard and special-sized tools.

# FOSMATIC JIG BORER

## AUTOMATIC POSITIONING

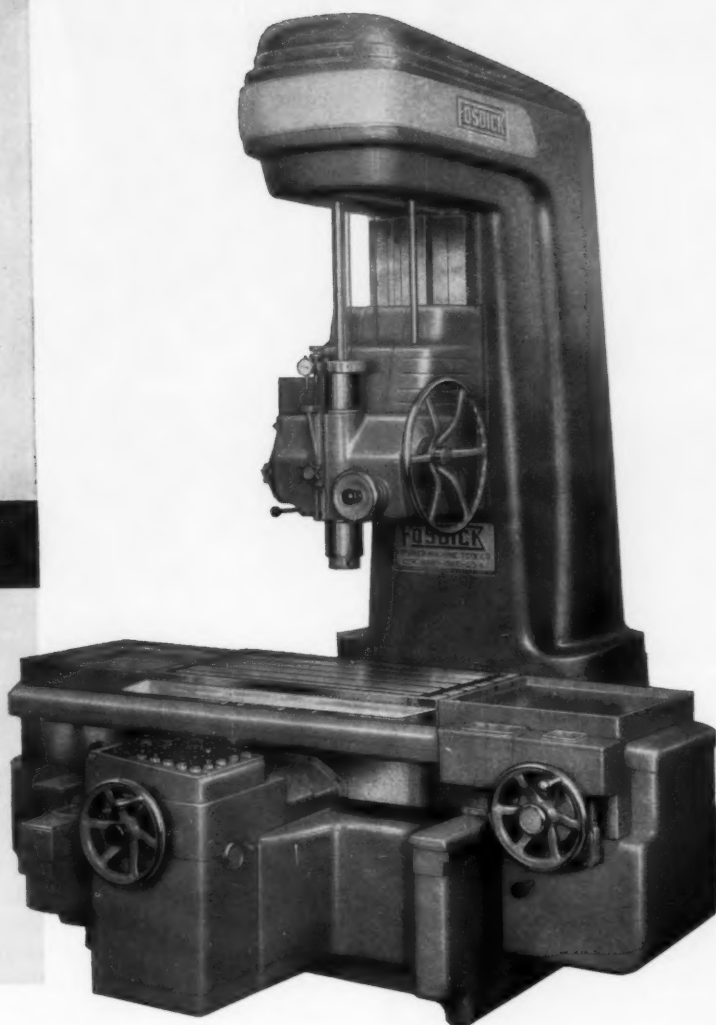
## DIRECT DIMENSION MEASURING





## BORE

*Push-button precision boring. For finish boring, change tools quickly, then bore at touch of button. The hardened alloy steel quill rides on 800 preloaded balls mounted in precision bushings located permanently at top and bottom of head—as close as possible to spindle nose for maximum rigidity. Spindle is guaranteed not to exceed .0002" runout at the end of 12" proving bar!*



## MEASURE - POSITION - CHANGE TOOLS START BORING... ALL IN SECONDS!


*hole size and position accurate to  $\pm .0001$ .*







The new Fostick Jig Borer can be used for the finest toolroom boring or for production of precision holes. Like the scores of Fostick Jig Borers in plants throughout the United States, this machine will perform consistently to  $\pm .0001"$ ... in measured table and saddle position as well as hole size.

The Fostmatic Jig Borer is extremely simple to operate. Changing of feeds and speeds, all movements of the table, saddle, and head can be accomplished by push button. Spindle is started and stopped by lever on head. Machine may be equipped with or without automatic positioning. Can be equipped for numerical control with either tape or card systems.

Other features available as extra equipment include Milling Feed, Rapid Traverse to Quill, coolant system and reversing motor for tapping.

*Ask for Fostmatic Jig Borer Bulletin, JB-M.*



|   |   |   |
|---|---|---|
|  |  |  |
|  |  |  |

**NEED DRILLING EQUIPMENT?  
GET A PROPOSAL FROM FOSDICK!**

# FOSDICK

**THE FOSDICK MACHINE TOOL CO.  
CINCINNATI 23, OHIO**

"Some change!"... thanks to Cities Service



## Uses one soluble cutting oil for class 4 steel, all other jobs!



**Precision Parts** made from hard alloy steels and other metals have brought an excellent reputation to Industrial Machine & Engineering Company. All are cut with Cities Service Chillo T Oil.



**Plant Manager Steven Peti** pioneered 10 years ago in use of soluble cutting oil for tough steel cutting jobs. Chose Cities Service Chillo T Oil after much experimentation with water solubles.

Whether it's brass, bronze, steel, or aluminum—and whatever its degree of hardness—Industrial Machine & Engineering Company cuts it with ease using Cities Service Chillo T Cutting Oil.

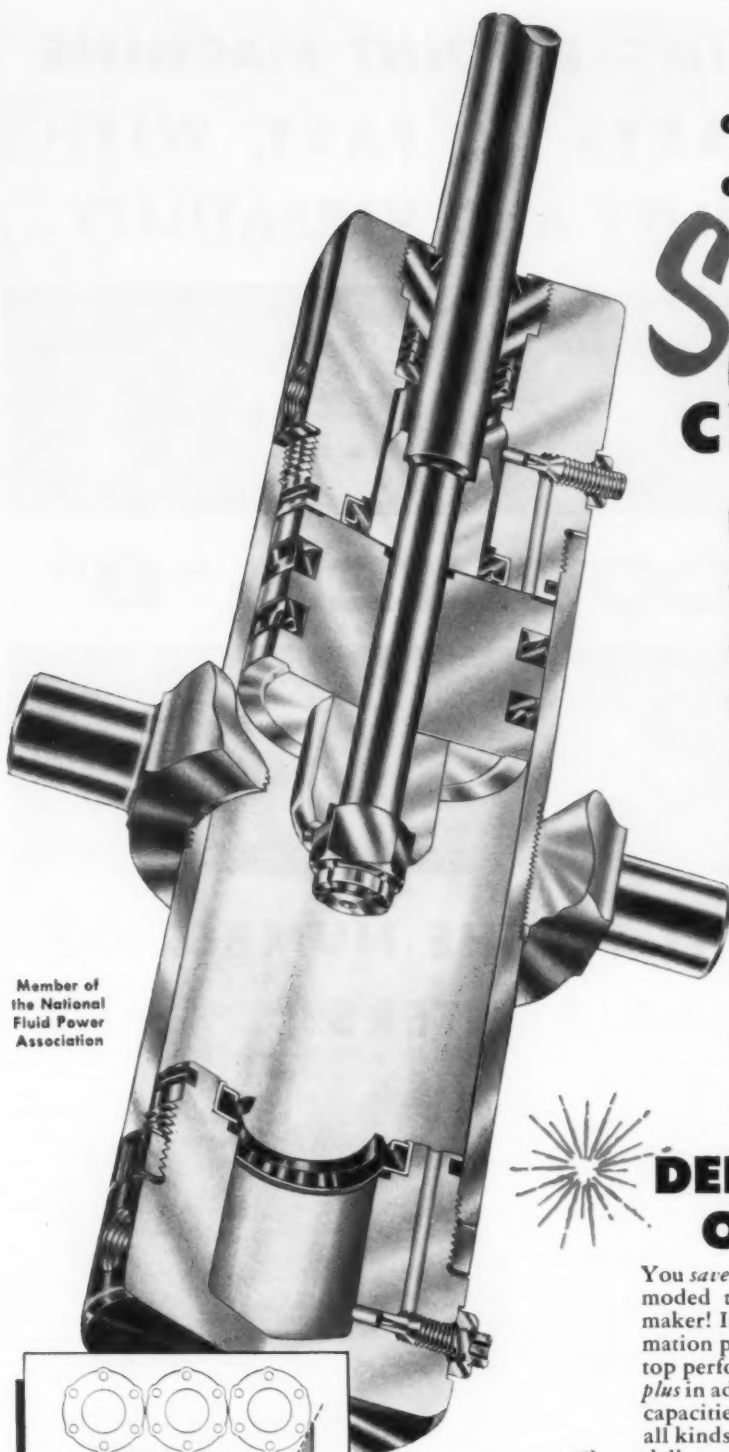
"In fact," says Plant Manager Steven Peti, "we've been doing it successfully for the past ten years. Of course, it wasn't easy to find the correct oil for all these jobs—and many people said a soluble oil couldn't possibly handle them all. But after considerable experimenting, we found that Cities Service Chillo T Cutting Oil not only could handle them, but save money in the process.

"Today, we have a shop completely free of smoke (some change from the old days when we used sulphur chlorinated oils) and never have to change oils for any job.

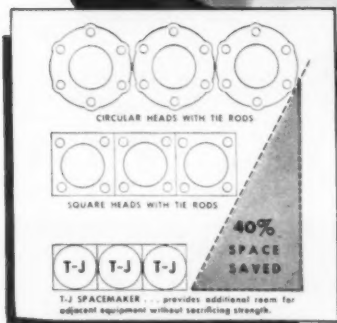
"In addition, we have found the oil has excellent extreme pressure qualities, an effective anti-rust inhibitor, and is a fine lubricant. Partly because of Chillo T, we've gained an excellent reputation for cutting precision parts from 347, 321, and 410 stainless steel, as well as 8740, 4130, and 4340 alloy steel. Naturally, we're mighty happy to do business with Cities Service."

Again and again, where there's a cutting problem, the answer lies in one of the Cities Service Chillo Cutting Oils. Find out which of these oils best suits your needs. Call in a Cities Service Lubrication Engineer, or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

**CITIES  SERVICE**  
QUALITY PETROLEUM PRODUCTS

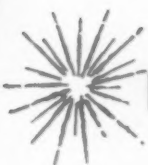


Member of  
the National  
Fluid Power  
Association



# all the **EXTRAS** are standard with **T-J** *Spacemaker* **CYLINDERS**

- **NEW exclusive** ingenious cushion designs . . . Super Cushion Flexible Seals for Air . . . New Self-Aligning Master Cushion for Oil.
- **STRONGER** than outmoded tie rod design, proven through actual tests. No tie rods to stretch.
- **SOLID STEEL HEADS** throughout the full line.
- **COMPACT DESIGN** eliminates tie rods, increasing the strength and reducing mounting space required, providing extra room for adjacent equipment.
- **HARD CHROME PLATED** body bores and piston rods . . . assure you of long trouble-free service. (Standard at no extra cost.)
- **METALLIC ROD SCRAPER**, not just a wiper, actually removes foreign matter from the rod.
- **PILOTED PACKING GLAND** with extra long bearing. Additional strength and support to the piston rod.
- **OIL pressure** to 750 p.s.i. AIR to 200 p.s.i.



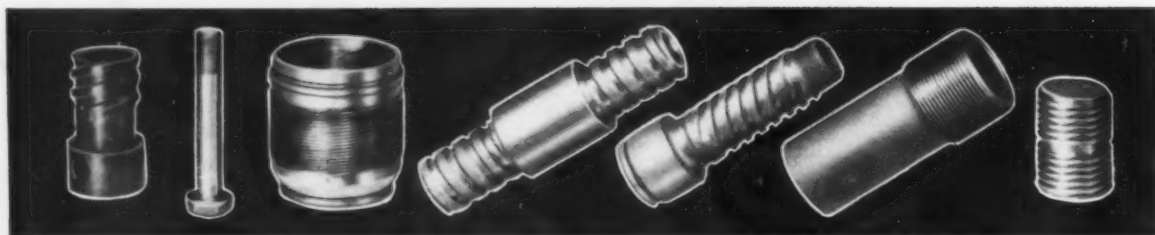
## **DELIVERY OFF THE SHELF!**

You save 40% space when you switch from outmoded tie rod cylinders to the T-J Spacemaker! It's stronger, too! Fits right into automation programs in countless plants. Delivers top performance and dependability with a big *plus* in advanced features. Wide range of styles, capacities . . . reduces man-hours and costs in all kinds of push-pull-lift operations. Off-shelf delivery in 64,000 combinations!

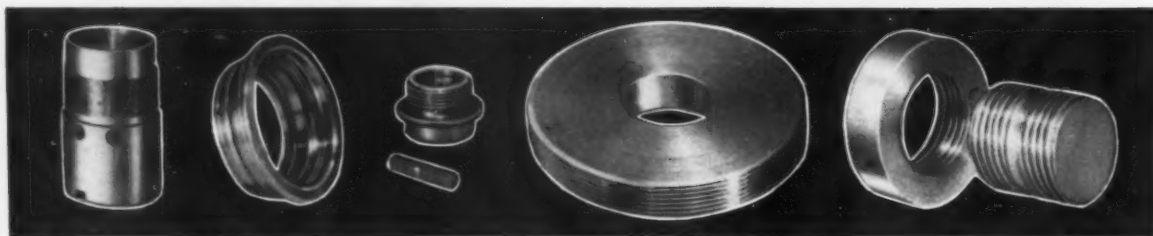
**NEW LITERATURE**—Send today for new Catalog SM56 with complete engineering details on Spacemaker line. Write The Tomkins-Johnson Co., Jackson, Mich.

**T-J TOMKINS-JOHNSON**  
PNEUMATIC AND HYDRAULIC CYLINDERS, VALVES, FITTINGS

**NO OTHER SINGLE POINT MACHINE  
THREADS PARTS AS FAST, WITH  
SUCH FLEXIBILITY AND VERSATILITY...**

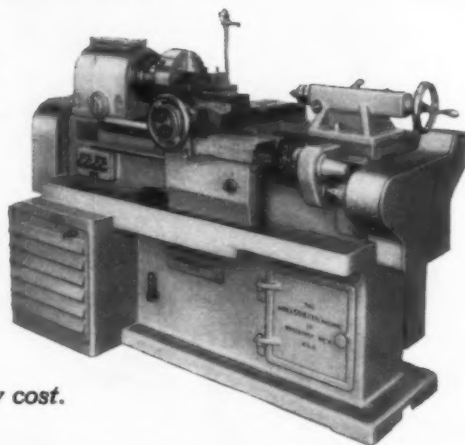


**...as the new COULTER "B"**



**WITH NO LIMIT TO THE NUMBER OF  
PARTS—PITCH—DIAMETERS!**

The new, mechanically operated COULTER "B," with completely automatic threading cycle control; quick changeover features for short runs; skip feed for multi-start; infinite spindle speeds; carriage positioning adjustments; internal clapper type threading bar and attachment; and simple pick-off gears—*guarantees to take the guesswork out of threading at low, low cost.*



*For more detailed facts ask for the new "B" catalog.*

**The *James* Coulter Machine Co.**

142 James Street, Bridgeport 4, Conn.  
Machine Tool Builders Since 1896



## Talking About Die Sets



with  
**Phil Marsilius**  
Executive Vice-President  
The Producto Machine Co.

**How to Select and Order a Catalog Die Set—**Do you always order the die set you *really* need for the job...or do you overlook a specification which results in your having to "make do" with the set you ordered or lose time by having to re-order?

Once again, we feel that a simple and basic practice should be emphasized because our daily experiences show that even the most painstaking individual occasionally overlooks one or more factors in preparing to place an order.

Here is our suggested check-list for selecting and ordering a catalog die set:

**1. Lay out the die.** Allow sufficient area for feeding devices and auxiliary stock guides that may be required. Determine also what areas must be left clear for part ejection or scrap.

**2. Determine type of set** you need—rear two-pin, four-pin, center-pin, etc.—according to tolerances and construction of die.

**3. Place layout on templates** for the type of die set you have chosen. Select die area that best meets the limits established in Step 1.

**4. Select material** for die set—semi-steel, all-steel or combination—based on the die's strength requirements.

**5. Select thicknesses** of punch and die holder in line with strength requirements and allowable press shut height.

**6. Determine length of guide-pin required\***, based on length of stroke or ram clearance.

**7. Determine type and length of bushing** and material from which it should be made, based on accuracy, speed of operation and required life expectancy of die.

**8. Select shank diameter** for the press on which die will be run.

**9. Choose grade of precision required**—Master or Commercial—based on tolerances and number of pieces to be produced.

**10. Order die set** which meets most closely the above requirements, making certain that *all* ordering information is included: Catalog number and quantity; Master (Precision) or Commercial grade; length of guide pin; type of bushing; diameter of shank or "no shank"; how to ship. Keep in mind that special thicknesses of punch holder and die holder can also be ordered if required.

Of course, you may not find it possible to check these points in the exact sequence presented. However, if you will make it a habit to use this check-list for each die set you need, you can avoid making costly errors in ordering.

\*"L" dimensions pertaining to pin length as shown in die set catalogs refer to distance from bottom of die holder to top of pins. They do not necessarily apply to actual guide pin lengths.

How to  
make your  
die maker  
a Most  
Happy  
Fellow



.....and save money, too!

It's easy. Just be sure to specify Producto die sets with *Qwik-Fit* guide pins.

Then your die maker will always be able to assemble and disassemble his die sets practically blindfolded! No longer will he have to line up pins and bushings cautiously...tediously hammer die sets together...or pry them apart. With *Qwik-Fit* guide pins, the die set almost *puts itself together*. The spherical-angular radius on these pins prevents jamming or cocking *regardless of how the punch holder is started on*.

Think of the time your die maker will save...and the money *you* will save. Dies are growing more complex daily and that means assembly and disassembly of the die set dozens of times. In plants all over the country, Producto's *Qwik-Fit* pins are saving up to 75% of the time formerly required for these operations.

To improve morale and increase productivity, join the growing ranks of die manufacturers and users who specify "Producto die sets with *Qwik-Fit* guide pins." They are available on Master die sets at no extra cost.

### HOW TO MAKE ORDERING EASIER:

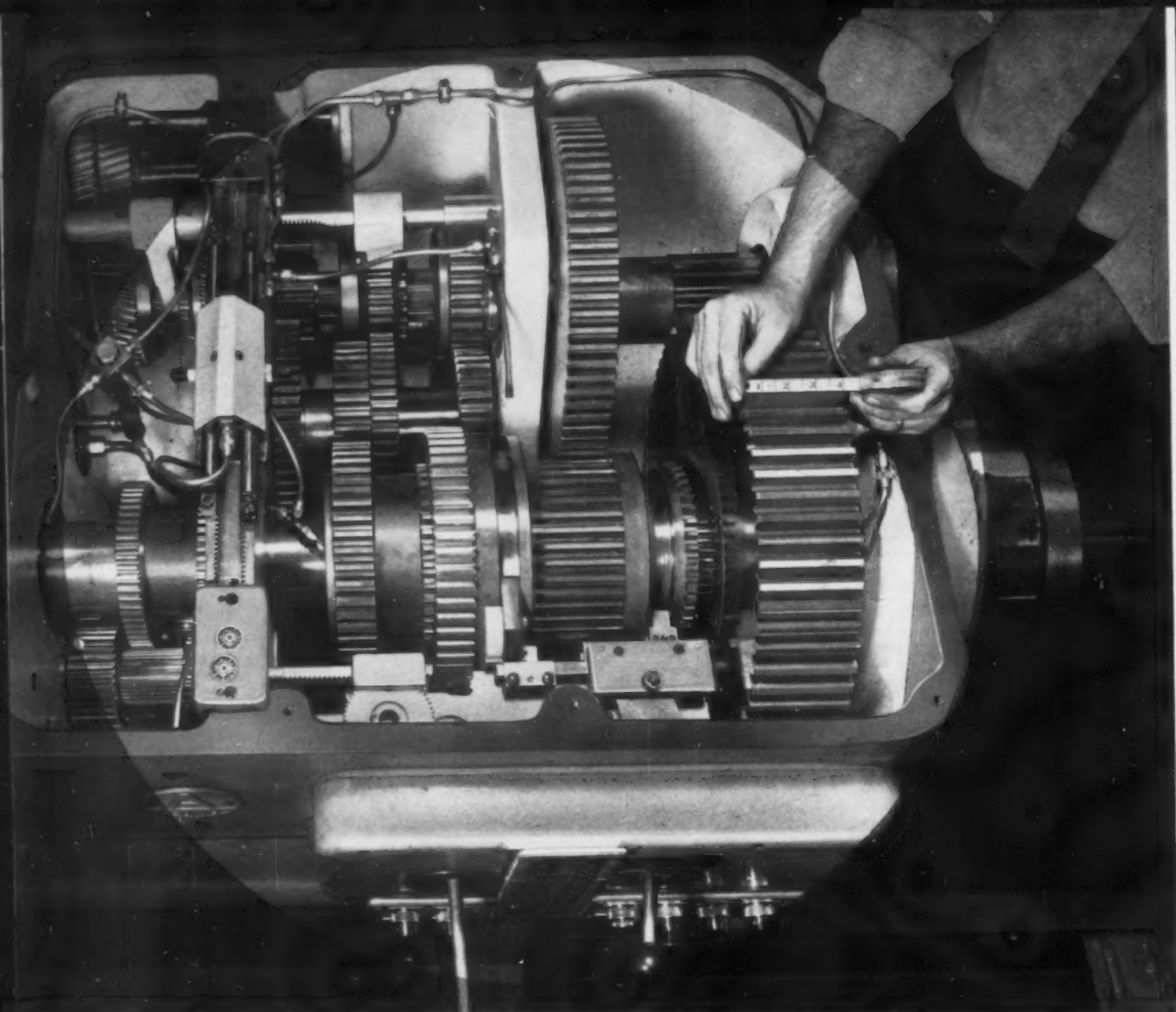
Get your free copy of Producto's Die Set Catalog No. 11, designed specifically to simplify your selection and ordering job. And ask to receive the idea-filled Die Set Digest, too.



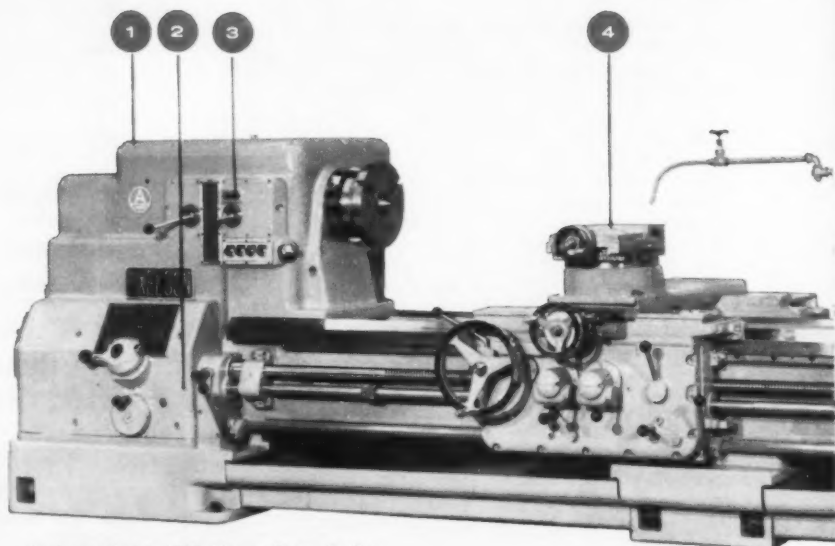
Wherever die sets are used

**PRODUCTO**  
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

THE PRODUCTO MACHINE COMPANY  
985 Housatonic Avenue, Bridgeport 1, Connecticut



- 1 The 24-speed headstock, designed to operate at 75 horsepower, will withstand peak loads of more than 100 horsepower. Spindle speeds are divided in true geometric progression from 6 to 750 r.p.m.
- 2 Totally enclosed gear box provides 81 feeds and 45 leads.
- 3 Two levers control speed selection, which is completely mechanical. Built-in horsepower meter is clearly readable from all operating positions.



Axelson Model 4025 Heavy Duty Lathe.

# 100-Horse POWERFUL

Here's power-packed precision. Compare the massive 19.900"-diameter 4"-face bull gear pictured at the left – and every other part of Axelson's new 4025 Heavy Duty engine lathe – you'll find that here is the greatest productivity per dollar invested in the machine tool field today.

Swinging 40" over the bed and 25" over the cross slide, this handsome workhorse is powered by a 75-horsepower motor capable of delivering more than 100 horsepower under peak loads.

Two levers on a new totally-enclosed gear box are used in the selection of 81 feeds

and 45 leads. Twenty-four spindle speeds are divided in true geometric progression from 6 to 750 r.p.m.

The main bed casting is girth designed with heavy longitudinal side ribs, center rib, and inverted-V cross ribs to insure the extreme rigidity required for new carbide and ceramic tooling. Replaceable hardened and ground alloy steel ways preserve original accuracy.

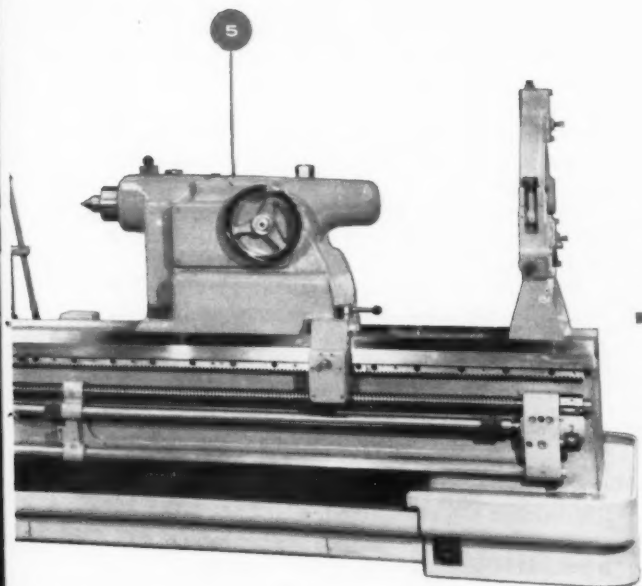
For complete details on the new 4025 Heavy Duty, or any Axelson lathe, call your nearest Axelson representative or write for Bulletin MM11-5504.



## AXELSON MANUFACTURING COMPANY

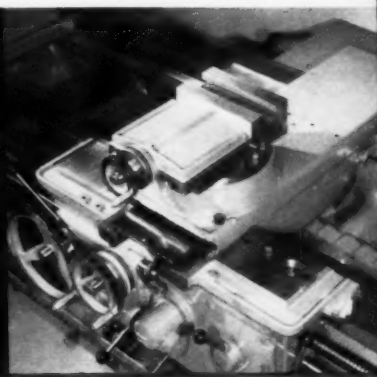
Division of U. S. Industries, Inc.

6160 South Boyle Ave., Los Angeles 58, California



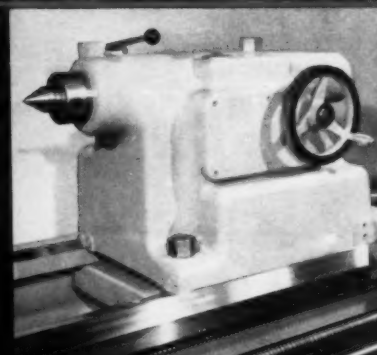
4

*Cast steel compound is capable of extended travel. Apron is extra-heavy box-type design, completely enclosed so all shafts and gears operate with automatic pressure lubrication.*

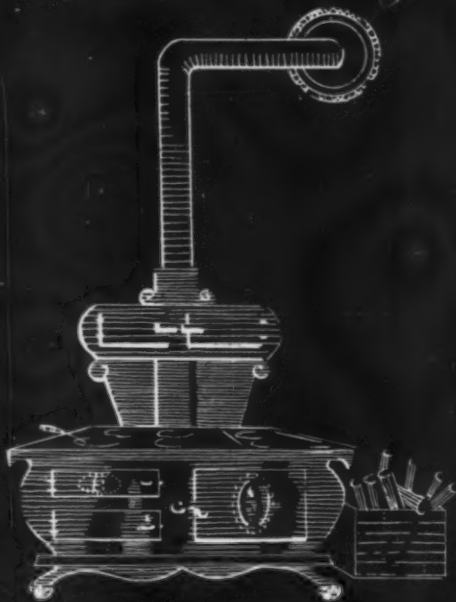


5

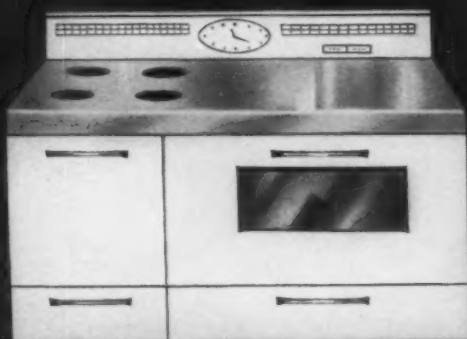
*Solid one-piece tailstock eliminates inaccuracies that might be caused by bolt stretch. Two-speed tailstock spindle provides 18" travel.*



*Great in its day...*



BUT WOULDN'T YOU  
RATHER HAVE THE LATEST  
.....  
TECHNICAL ADVANCE?



**NOW**

the latest technical  
advance in tools...

*"Job Tempered"*

## HAND and POWER Hack Saws

*Certified by American Standards  
Testing Bureau\* to meet  
their standards for superior  
cutting — Uniform Teeth...  
Uniform Set... Uniform Temper*

FROM **Heller**

Now you can cut all kinds of metal faster  
and cheaper... with hand or power hack saws  
... thanks to Heller's great new advance in  
tool technology — **JOB TEMPERING**.

Controlled-analysis steel is specially selected  
to strict Heller specifications, then Heller uses  
its own *unique* heat treating method to bring  
every blade to the precise hardness and temper  
to accomplish the class of work for which it  
is intended.

The result: **JOB TEMPERED** hand and power  
hack saw blades perform better and last longer  
on the toughest cutting jobs.

Based on this new development, every Heller  
blade is certified by American Standards  
Testing Bureau\* to meet the three vital require-  
ments for superior metal cutting — *Uniform  
Teeth, Uniform Set and Uniform Temper*.

You can choose the right **JOB TEMPERED**  
Blade from Heller's complete line. And if your  
sawing problem involves economy as well as  
the proper use of power hack saw blades, a  
**HELOMETER** will help prolong blade life, improve  
cutting and speed set-ups by showing you  
when blade tension is precisely correct.





## Big Benefits in the Heller Line of "Job Tempered" Hack Saw Blades

### GIVE US YOUR TOUGHEST HACK SAWING PROBLEMS

We'll show you how the *right* Heller JOB TEMPERED Blade can solve it efficiently and economically — delivering faster, smoother, trouble-free cutting over longer periods than ever before.

### HERE ARE THE FACTS!

New Heller Hack Saw Catalog gives full information on sizes and types offered... shows why Heller JOB TEMPERED Blades, backed by the American Standards Testing Bureau\*, are best in job performance.

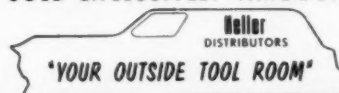
WRITE FOR  
YOUR COPY  
TODAY.



\*



SOLD EXCLUSIVELY THROUGH



**SERVICE + STOCKS = SAVINGS**



**HELLER TOOL CO.**

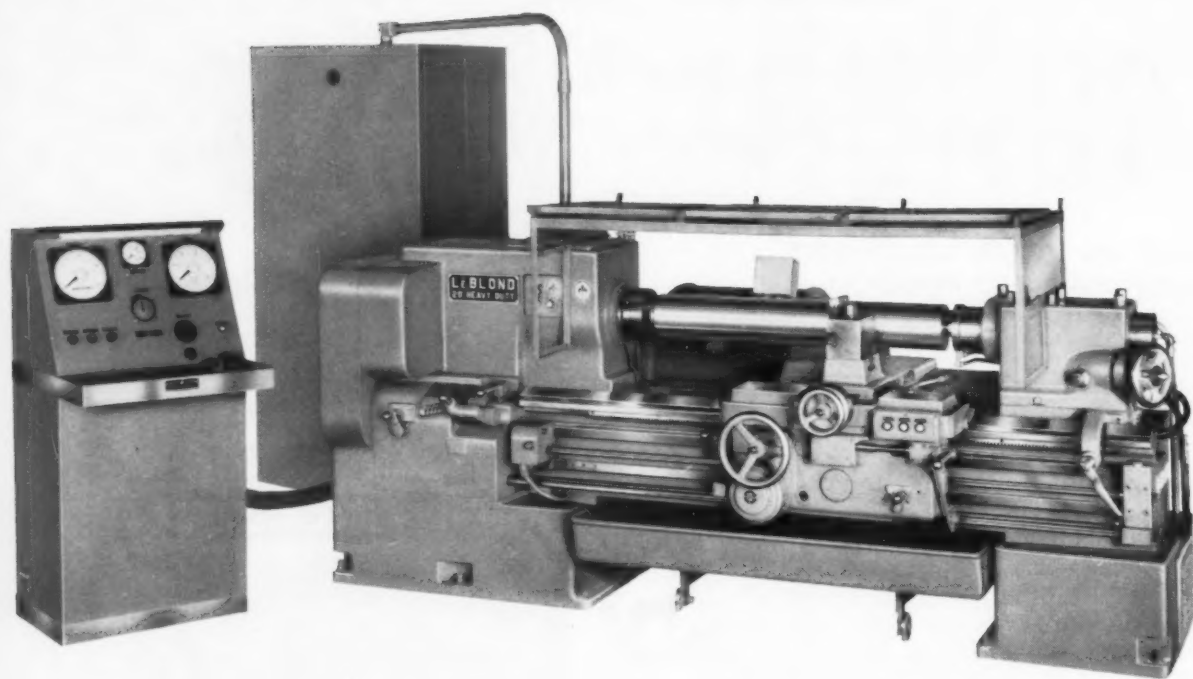
*America's oldest file manufacturer*

Newcomerstown, Ohio

A subsidiary of Simonds Saw and Steel Co.



## **This 150 H. P. LeBlond lathe**



Special LeBlond 20" uses 150 hp motor, provides infinite speeds from 250 to 5000 rpm, 90 feeds from .002 to .136. Special bearings in head and tailstock are cooled and lubricated by pressurized oil circulating system; common oil reservoir is temperature controlled by a thermostatic

heat exchanger. Remote-control station includes: motor-generator start and stop, spindle start and stop, length and cross feed engage and disengage, horsepower meter, spindle speed indicator, cutting speed indicator, spindle speed control, overload lights and timer.

To test new cutting media and tools to their limits, General Electric's Metallurgical Products Department (manufacturers of Carboloy cemented carbides) required a faster, more powerful lathe than any available. This high speed LeBlond 20" lathe was developed for this purpose. It will rev up to 5,000 r.p.m., make efficient use of its 150 h.p. and permit a 50% overload for short periods.

LeBlond lathes are noted for their inherent stamina and rigidity. In this case it was only necessary to make modifications in the headstock, tailstock spindle and controls—the rest of LeBlond's Heavy Duty 20" was already powerful enough to take the new high loads.

Just what will this lathe do? The following test data tell the story:

## tests tools for tomorrow

### TEST DATA

WORKPIECE—SAE 1045, 180 Brinell, 48" long.

TOOL—CEMENTED OXIDE 0 - 30.

#### Test 1

Workpiece diameter, 7.65". 5000 rpm 10,000 sfm  
.010 feed. Carriage travel, 50" per minute over entire  
workpiece .110 depth of cut. 138 hp consumed

#### Test 2

Workpiece diameter, 6.65". 4300 rpm 7500 sfm  
.010 feed. Carriage travel, 43" per minute over entire  
workpiece .110 depth of cut. 105 hp consumed

#### Test 3

Workpiece diameter, 6". 5000 rpm 7800 sfm  
.015 feed. Carriage travel, 75" per minute  
.100 depth of cut. 148 hp consumed

Perhaps you've been looking for a lathe with this kind of power and speed. Maybe you have another special turning problem with which LeBlond could help. Or you simply need a good dependable engine lathe. In any case, you can call on LeBlond with confidence. See your nearby LeBlond Distributor or write—

... cut with confidence

THE R. K. LEBLOND MACHINE TOOL COMPANY

Cincinnati 8, Ohio



World's Largest Builders of a Complete Line of Lathes for More Than 70 Years

# Up to 40% higher tightening torques keep a

—and only the combination of an UNBRAKO screw

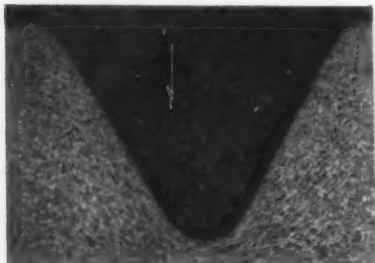
## RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)

| SCREW SIZE | UNBRAKO | SET SCREW<br>B | SET SCREW<br>C | MINIMUM<br>DIFFERENTIAL<br>% |
|------------|---------|----------------|----------------|------------------------------|
| #4         | 5       | 3.9            | 3.5            | 28                           |
| #5         | 9       | 7.8            | 7.4            | 15                           |
| #6         | 9       | 7.8            | 7.4            | 15                           |
| #8         | 20      | 14.7           | 14.5           | 36                           |
| #10        | 33      | 26.5           | 25             | 25                           |
| 1/4        | 87      | 62             | 60             | 40                           |
| 5/16       | 165     | 122            | 125            | 32                           |
| 3/8        | 290     | 198            | 225            | 29                           |
| 7/16       | 430     | 309            | 350            | 23                           |
| 1/2        | 620     | 460            | 500            | 24                           |
| 5/8        | 1225    | 1106           | 1060           | 11                           |
| 3/4        | 2125    | 1540           | 1800           | 18                           |
| 7/8        | 5000    | 3660           | 4600           | 9                            |
| 1          | 7000    | 5025           | 6500           | 8                            |

The High-Torque UNBRAKO socket set screw is made to withstand the highest tightening torques ever used to seat a set screw—up to 40% higher than an ordinary set screw. But to take full advantage of this UNBRAKO feature you must have a key that can apply the force required to seat it without damaging the screw or snapping the key. The High-Titan UNBRAKO hex key is designed specifically to set a High-Torque UNBRAKO so that you can be assured of full high-torque performance every time.

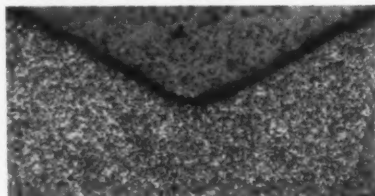
**Here's why a High-Torque UNBRAKO  
can be seated tighter—and stay put**

### UNBRAKO SET SCREW



It has fully formed threads that make the whole screw stronger. The metal is compressed into the closely knit grain structure that you see in this illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. The UNBRAKO retains its flow lines even when ground down to .010 in. below root diameter. Screws with cut or ground threads lose thread format root diameter.

### UNBRAKO SET SCREW



The High-Torque UNBRAKO has a radius in the socket corners. This eliminates the sharp corners where cracks start. It also distributes the stresses developed when tightening torques are applied. Ordinary socket screws have sharp corners which often crack when tightened even at lower torques than those recommended for UNBRAKO.

### UNBRAKO SET SCREW



### ORDINARY SET SCREW



The High-Torque UNBRAKO has a deeper socket, which gives you more purchase with the wrench. Since more wrench can be put into the UNBRAKO socket, you can set the screw much tighter. And you won't ream the socket or round the corners of the wrench.

### UNBRAKO SET SCREW

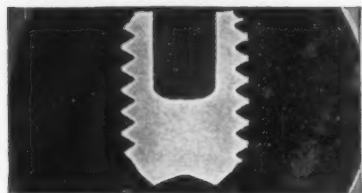


The High-Torque UNBRAKO is properly heat treated, kept clean. Its grain structure is uniform. It is free of decarburization. There's no danger of stripping the threads or shearing the point when tightening



# High-Torque UNBRAKO socket set screw tight and key assures full *high-torque* performance

## ORDINARY SET SCREW



torques are applied. The ordinary screw is suffering from an overdose of decarburization; socket walls, threads and point

are full of the telltale white spots that identify it.

And here's why an UNBRAKO High-Titan hex key can be used to apply far more tightening torque to a High-Torque UNBRAKO socket set screw than is needed without damaging either the screw or the key.

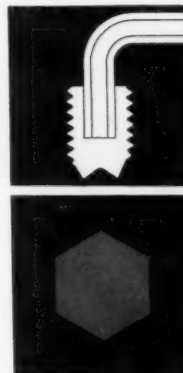
The High-Titan UNBRAKO is not an ordinary hex key. It is a precision internal wrenching tool with high ductility, specially designed to assure full high-torque performance. It is made of special alloy steel bar stock, inspected magnetically and chemically to make sure that the material is flawless and of the specified properties.

Its sides are flat and parallel. The corners,

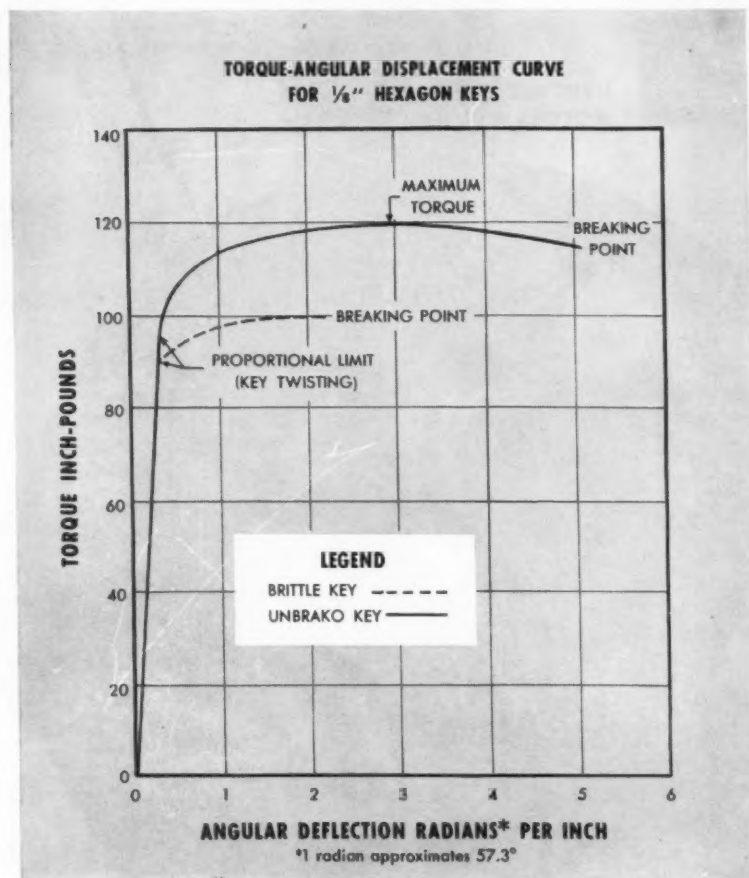
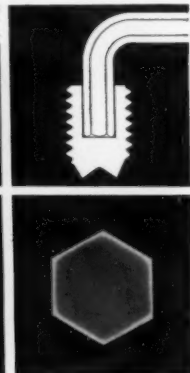
which exert torque on the inner walls of the socket, are sharp and tough. The bend is strong.

The High-Titan UNBRAKO is accurately sized across the flats and across the corners to insure snug fit and full wall contact. It won't ream or wear an UNBRAKO socket. The square cut end engages the full depth of the socket for greater tightening power. It gives you up to 25% more wrench engagement than a key with a chamfered end.

## UNBRAKO KEY



## CHAMFERED END KEY



The High-Titan UNBRAKO hex key is heat treated in modern atmosphere-controlled furnaces. The surface is casehardened without decarburization. The extra hard surface gives the key longer life. And it retains its dimensional accuracy, is tougher and more ductile than ordinary keys. This torque-angular displacement curve for 1/8 in. hexagon keys distinguishes a High-Titan UNBRAKO from an ordinary key. The High-Titan UNBRAKO has a higher yield point and a higher breaking point—you can exert a much higher torque with it without snapping the key.

Be sure you get the full high-torque performance offered only by the combination of a High-Torque UNBRAKO socket set screw and a High-Titan UNBRAKO hex key. Both products are stocked by authorized industrial distributors. Ask the one nearest you for complete information. Or write STANDARD PRESSED STEEL CO., Jenkintown 19, Pa.

We also manufacture precision titanium fasteners. Write for free booklet.

Unbrako Socket Screw Division

**SPS**

Jenkintown, Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Cooper Precision Products • Standco Canada, Ltd. • Unbrako Socket Screw Co., Ltd.

# MULTIPRESS

**boosts carbon core production 33%  
at CLEVELAND GRAPHITE BRONZE**

Cleveland Graphite Bronze has increased the production of soft carbon cores for aircraft bearing castings by 33% using a 25-ton Denison hydraulic Multipress.

Machining cores to shape, the best alternative method, can be done at the rate of 70-75 per hour. With Multipress, 100 cores are formed in the same period. Soft carbon at one-tenth the cost can be used instead of the hard carbon required in a machining operation.

Datalog COM-3 describes this operation in detail.

For your copy, write Denison Engineering Division, American Brake Shoe Co., 1152 Dublin Road, Columbus 16, Ohio.



HYDRAULIC PRESSES • PUMPS  
MOTORS • CONTROLS

Hydraulic ram on 25-ton Multipress descends to press carbon into core form in the first stage of two-part operation.

Plug is removed from soft carbon core after stripping operation at Cleveland Graphite Bronze.



Denison, Denison HydrOilics, and Multipress are registered trademarks of Denison Eng. Div., ABCO

**NORTON**

**IS NUMBER**

**1**

**IN ABRASIVES**  
*throughout the world!*

Number **1** in Supplying  
the Abrasives You Need  
for Your Work



*Making better products...  
to make your products better*

**NORTON**

**IS NUMBER**

**1**

**IN ABRASIVES**  
*throughout the world!*

**In Product Variety**

— a complete line of grinding wheels and abrasives to meet *all* your grinding and finishing requirements.

**In Engineering Service**

— skilled abrasive engineers the country over to help you solve your grinding and finishing problems.

**In Customer Service**

— distributor stocks in over 315 cities, large warehouse stocks in five cities, immense factory stocks — all backed by the production facilities of the world's largest grinding wheel plant.

**In Abrasive Research**

— over 180 scientists and technicians in specialized laboratories using the very latest scientific apparatus developing new and improved abrasives and bonds to cut your grinding costs.

**NORTON COMPANY • WORCESTER, MASS.**

General Offices: Worcester 6, Mass.

Grinding Wheel Plants: Worcester, Mass., and Santa Clara, California

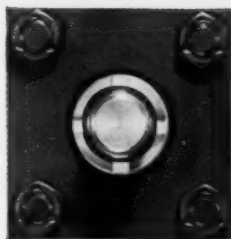
District Offices: New York Area (Teterboro, N.J.) • Philadelphia\* • Pittsburgh\* • Chicago\*  
• Cleveland\* • Detroit\* • St. Louis • Hartford • Los Angeles Area (Huntington Park)

*\*Warehouse Facilities and Stocks at this location*

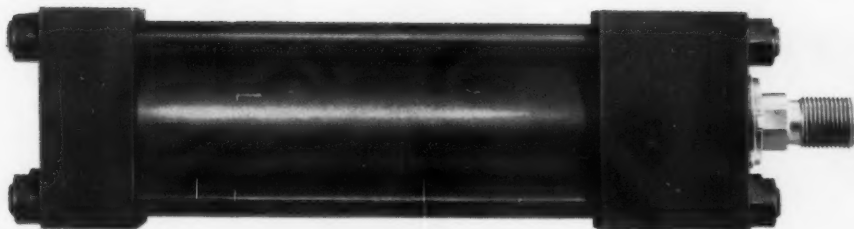
Plants and distributors around the world

BEHR-MANNING CO., Troy, N.Y. is a division of Norton Company





Made for the tough buyer



**The discriminating engineer** is intolerant—intolerant of anything but the very best in his plant and in his product.

For these tough buyers Hannifin cylinders are made. Into these cylinders go original, exclusive features of design, precision manufacture, and the ability to outperform others with the very minimum of maintenance.

You would expect to pay more for Hannifin cylinders. Actually there is no price premium. We can deliver them to you promptly in the sizes and mounting styles you require.

AIR AND HYDRAULIC

**HANNIFIN**

POWER CYLINDERS

Write for your copy of this new Hannifin Cylinder File—complete, easy-to-use, easy-to-order-from information on five lines of Hannifin cylinders. Hannifin Corporation, 509 South Wolf Road, Des Plaines, Illinois.



# NIAGARA HAS THEM!



SERIES A, 5 1/2 - 110 tons



SERIES AA, 32-200 tons



SERIES E, 75-200 tons  
Front-to-Back Crankshaft

## READILY EQUIPPED TO HANDLE



14 pt. Mechanical Sleeve



18 pt. Electro-Pneumatic Sleeve



Electro-Pneumatic Friction



Single Cylinder



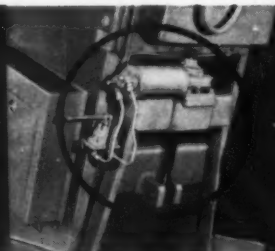
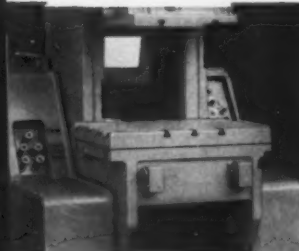
Tandem Type

### THREE TYPES OF CLUTCHES

Each Niagara Incliner features the clutch best suited for the purpose. (1) Famed Niagara multi-jaw mechanical sleeve clutch. (2) Exclusive Niagara multi-jaw Electro-Pneumatic sleeve clutch. (3) Niagara low inertia Electro-Pneumatic friction clutch.

### FOUR TYPES OF DIE CUSHIONS

Designed and manufactured by Niagara, single cylinder and tandem type pneumatic die cushions are built in 4 types to make any Niagara Incliner a double action press. Self-lubricating models are available for automated OBI's.



SPECIAL BOLSTER PLATES  
J.I.C. CONTROLS FLANGED SLIDES  
POWER SLIDE ADJUSTMENT  
FLYWHEEL BRAKE  
DIE AREA LIGHTING  
MOTOR CUTOUT SWITCH

### EQUIPPED FOR AUTOMATION

Featuring the most advanced controls and devices, Series EA (automated models) are engineered for peak productive capacity. Here's a line of OBI's that is completely equipped by Niagara for operation in your automation lines.

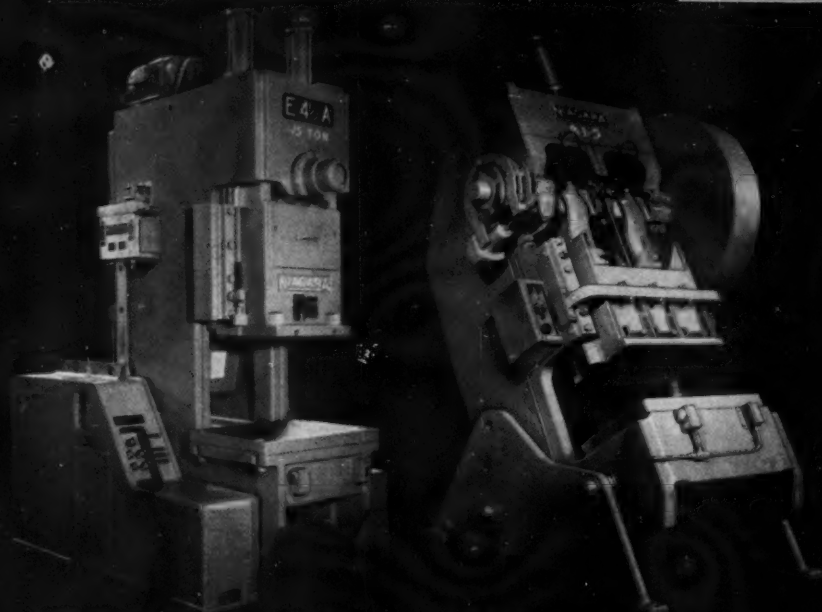
### POWER INCLINING DEVICE

Fast-acting, safe and easy to operate, Niagara's air motor inclining device (shown above) is furnished as an optional accessory.

### WIDE CHOICE OF ACCESSORIES

With a full selection of modern press accessories available, Niagara Standard Incliners are adaptable to the widest possible range of job assignments.

# standard OBI presses in all sizes and types that are right for you!



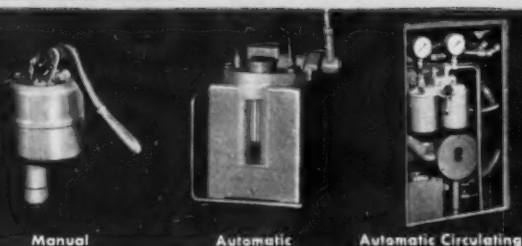
SERIES EA (Automated), 75-200 tons  
Front-to-Back Crankshaft

SERIES BI, 60-200 tons  
Double Crank

5 LINES . . . 34 MODELS  
EACH A CHAMPION IN ITS CLASS:

Niagara offers you industry's most complete, most modern, and most exclusive selection of standard inclinables . . . plus an unequalled choice of press accessories and automatic devices to meet your specific job requirements. You can count on Niagara for inclinables that will do the most to speed production, assure accuracy, prolong die life and hold down maintenance costs within your plant.

## YOUR WORK MOST PROFITABLY



Manual

Automatic

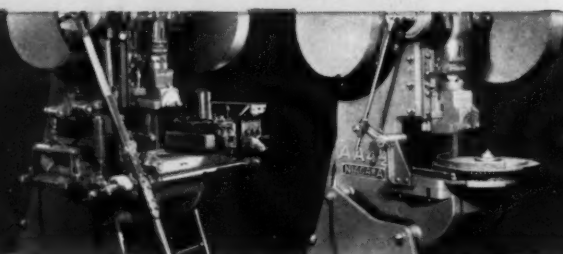
Automatic Circulating

### CENTRALIZED LUBRICATION TO FIT THE NEED

Niagara Inclinables are readily equipped with either manually-operated or automatic lubricators, or automatic circulating oil systems. It's one of the many ways in which Niagara outfits standard inclinables to meet individualized requirements.

### ALL TYPES OF AUTOMATIC FEEDS

To speed production, Niagara Inclinables are easily equipped with complete, automatic feed arrangements: single roll, double roll, dial, chute, magazine and specially engineered types. Variable speed drives can be provided to allow adjustment for the optimum speed consistent with the die, material and feed length.



# NIAGARA

America's most complete line of presses, press brakes, shears,  
other machines and tools for plate and sheet metal work.

**GET ALL OF THE FACTS** on any or all Niagara Inclinable Presses. Consult with a Niagara representative. His recommendation will be impartial. He has all types of OBI's to offer. At your request, specific Bulletins on each series, containing complete information and specifications, will be mailed to you promptly.

**NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.**

DISTRICT OFFICES:

Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia  
Distributors in principal U. S. cities and major foreign countries



## Why designers specify FLEXLOC self-locking nuts

Where products must be tough . . . must stand up under vibration, shock and abuse . . . designers specify rugged, reliable, precision-built FLEXLOC self-locking nuts as fasteners.

### HERE'S WHY:

FLEXLOC locknuts are strong: tensile strengths far exceed accepted standards. They are uniform: carefully manufactured to assure accurate, lasting spring tension in the flexible locking collars. And they are reusable: rough screw threads,

*We also manufacture precision titanium fasteners. Write for free booklet.*

repeated removal and replacement, frequent adjustments will not affect their locking life.

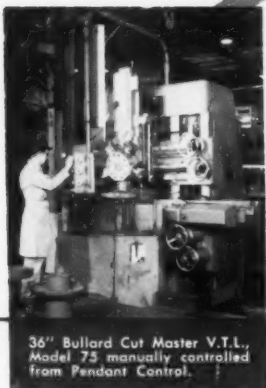
Standard FLEXLOC self-locking locknuts are available in a wide range of standard sizes and materials, to meet the most critical locknut requirements. Your authorized industrial distributor stocks them. Write us for complete catalog and technical data. Flexloc Locknut Division, STANDARD PRESSED STEEL CO., Jenkintown 19, Pa.

**FLEXLOC** LOCKNUT DIVISION

STANDARD PRESSED STEEL CO.

**SPS**  
JENKINTOWN PENNSYLVANIA





36" Bullard Cut Master V.T.L., Model 75 manually controlled from Pendant Control.

*no need for Obsolescence  
with*

**BULLARD**

## VERTICAL TURRET LATHES

*Model 75*



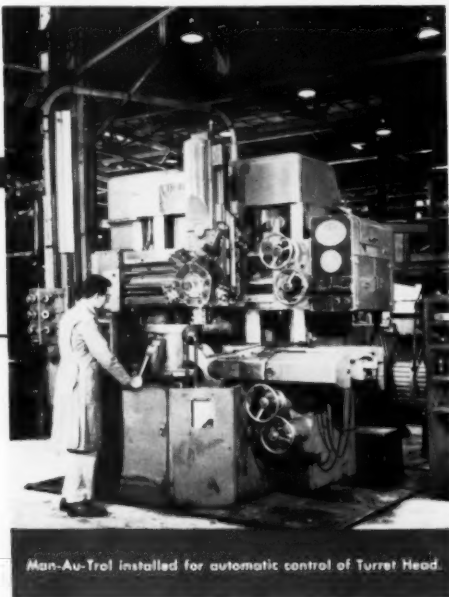
Bullard Service Engineer guides Man-Au-Trol Conversion Unit into place.



Electrical connections for Man-Au-Trol are wired into Cut Master Control Panel.

In May, 1955, Hyster Company, Peoria, Illinois, installed a 36" Cut Master V.T.L., Model 75 and by the end of 1956 it was evident that due to increased requirements an automatically controlled machine was necessary. *Did this obsolete the Cut Master?* — No sir — it only meant adding a Man-Au-Trol Conversion Unit to Cut Master *right in their plant. And it was accomplished in only four days.* No need to obsolete Bullard Cut Master, Model 75 — just convert them.

*another way to cut costs when  
cutting metal — **buy BULLARD***



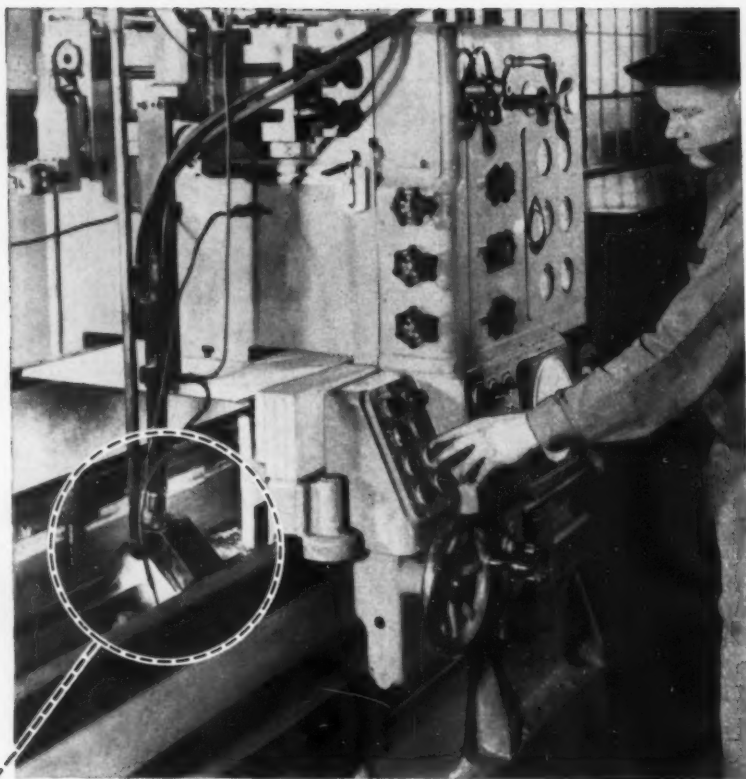
Man-Au-Trol installed for automatic control of Turret Head.

For the complete information on Bullard Vertical Lathes call our nearest Sales Office or Distributor.

THE  
**BULLARD  
COMPANY**

B R I D G E P O R T 9 , C O N N E C T I C U T

# HIGH SPEED FLAME- HARDENING



*Cross-section view shows  
uniform depth of hardened surface.*

## SPECIAL MACHINE UPS LIFE OF GRAPHITIC STEEL PARTS

LINDE engineers have assisted Cincinnati Steel Treating Company in developing a flame hardening machine which increases service life of 16 ft. long, graphitic carbon steel lathe ways . . . Development of this automatic, high speed machine is another example of how LINDE Service Engineers are helping LINDE's customers up production speed and unit quality through co-operative research engineering.

With this new machine, a lathe way to be treated is placed on a magnetic chuck in a water filled channel. Flame-hardening heads and control mechanism move at predetermined speeds along the part. After it cools, the lathe way is placed in a refrigerator for 24 hours which stabilizes the steel, and brings its case hardness to a minimum of 60 Rockwell "C" scale.

The benefits of LINDE's research, engineering, and over 40 years of accumulated know-how stand behind each of its customers to help them solve production problems. Get these "plus-values" which LINDE offers—it pays you to do business with LINDE.

## LINDE COMPANY

30 East 42nd Street, New York 17, N. Y.

In Canada: LINDE COMPANY, Division of Union Carbide Canada Limited

"Linde," "Oxweld," and "Union Carbide" are trade-marks of Union Carbide Corporation.

DIVISION OF **UNION  
CARBIDE** CORPORATION

**ANNUAL** savings of about \$150,000 — that's what Harris-Seybold Company is getting out of an equipment replacement program at its Cleveland plant.

Largest U. S. producer of offset lithographic printing presses and paper cutting machines, Harris-Seybold is one of two major operating divisions of Harris-Intertype Corporation. The parent company is one of the world's largest and most diversified printing equipment manufacturers. Two of the five major Harris-Intertype plants in this country and England are operated by Harris-Seybold. The corporation also has half a dozen smaller plants.

At Harris-Seybold's Cleveland plant, where the large offset presses are made, the company has followed a formal "Capital Expenditures Guide Program" for nine years, and has extended it to other plants. The annual savings rate increases each year as new machine-tool replacements are made.

In one recent 15-month period at Cleveland, some 30 pieces of equipment were replaced with modern machines at a cost of almost \$550,000. In the process, the average age of the plant's equipment was reduced from 13.3 to 11.5 years.

Harris-Seybold outlines its four-step program this way:

*First*, all equipment is inventoried by type, age and condition. Data are carefully recorded and listed.

*Second*, equipment that can be replaced practically in a five-year period, is entered in a five-year plan — including the antiques, the bottlenecks, the ones that won't hold tolerances and the inefficient, high-operating-cost units.

*Third*, the five-year list is split into five one-year lists. Machines which can be replaced with the greatest improvement in costs or quality are put at the top of the list. Others are listed in order of replacement importance. The industrial engineering department makes selected studies of equipment on the first-year list. Each analysis is submitted to management for replacement approval. The list is then adjusted, consistent with over-all operating plans for the year.

*Fourth*, the program is studied for possible refinement and correction. An important phase is the review of past replacements to see how predicted results and savings compare with experience, providing a "make-good" report to management on each major purchase. This has led to some reweighing of factors. Future estimates and calculations should be increasingly accurate.

Each year the five-year and one-year plans are reviewed and adjustments are made.

## Four Steps to Modernization

*By George C. Houck*

President

HARRIS-SEYBOLD COMPANY  
(A Division of Harris-Intertype Corporation)  
Cleveland, Ohio

November  
1957

*Be well informed regarding  
modern metal-working  
production ideas... replace  
machinery and equipment  
scientifically and with  
confidence.*

**Rockford Insert Group**

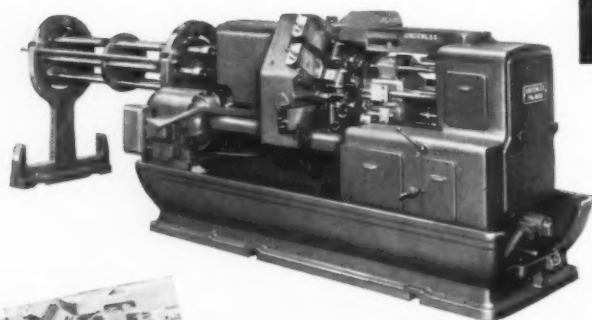
- 1 Simplified cross-slide camming
- 2 Interchangeable cross-slide tool holders
- 3 Quick-adjusting stroke mechanism
- 4 Rapid speed and feed changes
- 5 Wide-open, easily reached tooling area
- 6 Built-in threading feed and drive
- 7 Easily accessible main toolslide holders
- 8 Stationary type collets changed quickly

**eight big  
reasons  
why you get**

*Fast  
Setups*

**on  
GREENLEE  
BAR  
AUTOMATICS**

In plant after plant countless hours of setup time are saved each year on Greenlee Bar Automatics. Similar savings in time and money can be achieved in your own plant. Greenlee has on-the-job case studies to prove it. Whether your responsibility lies in the field of management . . . production . . . engineering . . . or purchasing you owe it to yourself and your company to call in the Greenlee man. Let him show you why and how faster setups on a Greenlee pay off in greater profits



**WRITE TODAY  
FOR CATALOG  
A-405**



**4-SPINDLE...6-SPINDLE  
SECOND-OPERATION  
PNEUMATIC STOCK FEED**



**GREENLEE BROS. & CO.**  
1871 Mason Avenue  
Rockford, Illinois



Machinery, November, 1957

**MACHINES DESIGNED TO MEET YOUR NEEDS ROCKFORD, ILLINOIS, U.S.A.**





## all-new 32-speed geared-head lathe

Here are the all-new Hendey No. 2013 and No. 2516 lathes, with an all-geared, 32-speed headstock, complete line-up of toolroom features, and heavy-duty design combined with toolroom precision. The greatly simplified mechanical design gives you more machine, dollar for dollar, than any other lathe in the same class.

**32 spindle speeds:** You quickly and easily select the speeds (from 18 to 2000 rpm) through two selector dials. Crowned, flame-hardened spur gears simplify design and reduce maintenance. You get maximum power for production work.

**66 feed and thread changes:** Quick-change spur gears, mounted on involute splines, are selected through two dials. Quick-change threads per inch range from 2 to 120. Feed range is from .0015 in. to .091 in. per revolution. There's an automatic overload release for the carriage feed. Load meter on the headstock tells the operator when he is taking full advantage of available power.

**Toolmaker features:** This lathe has them all: (1) multiple-thread indexing spindle, (2) built-in thread-chasing dial, (3) 66 threads, from 2 to 120 per inch, (4) reverse lever on apron, (5) automatic micrometer stops, (6) ball-thread-chasing stop on cross-feed screw, (7) hardened and precision-ground cross-feed screw and compound screw, (8) automatic, filtered lubrication to half nuts.

**New two-speed tailstock:** Compare these features with costlier lathes on the market: Weighing almost 400 lb, the tailstock still can be positioned quickly and easily with one hand. Ways under it are hardened and ground. Large 4½ in. diameter spindle has full 10 in. extension, with slow and rapid traverse speeds.

**Automatic spindle adjuster:** Spindle bearings never need adjusting regardless of operating speed you select. Three sets of super-precision tapered roller bearings support the spindle at both ends and in the middle, increasing accuracy and improving finish.

*Hendey* machine division  
BARBER-COLMAN COMPANY

112 Loomis St., Rockford, Illinois



Machinery, November, 1957

CITY OF MACHINE-TOOL SPECIALISTS **ROCKFORD, ILLINOIS, U.S.A.**



*top cutter design  
saves 50% in cutter cost,  
reduces cutter breakage*

**BARBER-  
COLMAN**  
recommends:

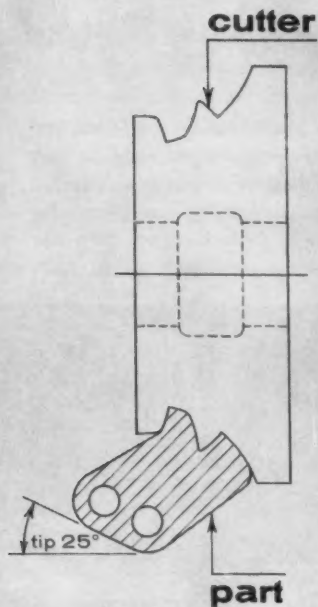
a single solid form relieved cutter to  
replace two former cutters

Improved design to increase tool life  
and reduce cutter breakage



Machinery, November, 1957

MACHINES DESIGNED TO MEET YOUR NEEDS **ROCKFORD, ILLINOIS, U.S.A.**



This Barber-Colman unground form-relieved milling cutter takes the place of two milling cutters formerly operated as a gang for milling these lever sectors. The proportions of the cutter were improved by reducing the cutter diameter and increasing the bore diameter. These improved proportions provide greater rigidity in the cutter and in the milling operation. As a result, initial cutter cost has been reduced 50%, and cutter cost-per-piece further reduced through extended tool life and reduced breakage.

The form on the workpiece is located with respect to the cutter axis to allow sufficient clearance behind all cutting edges. In this particular application, the workpiece is positioned at 25° relative to the cutter axis, permitting the manufacture of a one-piece cutter with adequate cutting clearance.

The material in the part is soft steel of maximum machineability. For best cutting efficiency, the cutter was designed with adequate clearance for milling this material. Cutters are 5" diameter with 1 1/4" bore as compared with previous cutters of 6" diameter and 1" bore.

Replacement with a single form relieved cutter has simplified cutter resharpening and reduced cost-per-piece. All Barber-Colman form relieved cutters are index sharpened across the face of the teeth. Cutters are simply and easily resharpened on conventional equipment or Barber-Colman automatic hob and cutter sharpening machines.

With Barber-Colman improved cutter design, pieces are milled at the rate of 3 1/2" per minute feed, and 150 R.P.M. cutter speed. Tool life averages 3,000 pieces per sharpening.

If you are seeking ways to improve your milling cutter efficiency, consult Barber-Colman cutter engineers. Their skill and experience in applying advance cutter design features will help to solve your milling problems.



## BARBER-COLMAN COMPANY

8211 ROCK STREET • ROCKFORD, ILLINOIS

*Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines*



Machinery, November, 1957

FOR PRODUCTION MACHINE TOOLS IT'S

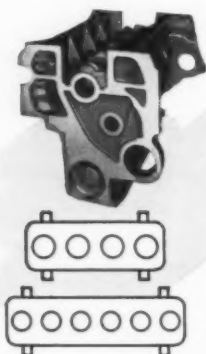
**ROCKFORD, ILLINOIS, U.S.A.**



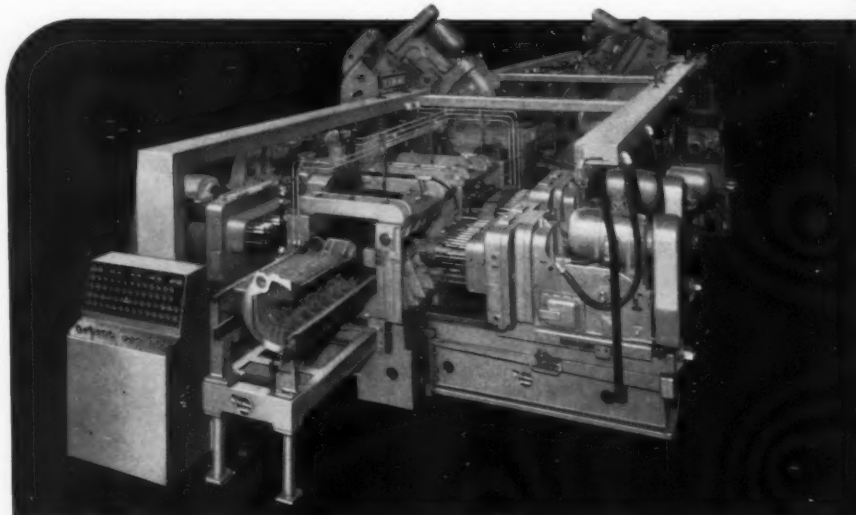
# DUAL-PURPOSE SPECIALS.

● Here's another outstanding example of how W. F. & John Barnes Coordinated Creative Engineering and Manufacturing Service has helped cut production costs . . . this time for a well-known farm equipment manufacturer. These three special machines have been ingeniously designed to machine TWO SIZES of

tractor engine blocks . . . double-duty performance that not only means a lower original investment, but also simplifies tooling, reduces floor space requirements, and increases over-all production efficiency. Careful planning of tooling and machine components holds change-over time to a minimum . . . in fact,



Both 4 and 6-cylinder blocks are processed on the same Barnes' Special Machines.



## SAVE TIME WITH BARNES' COORDINATED 6-POINT BUILDING SERVICE

"Shopping around" is often a costly, time-consuming task, and all too often the results are disappointing . . . that's why Barnes offer a complete machine tool building service from one convenient source . . . it saves time and cuts costs because all the work is coordinated in one plant. Barnes' service includes:

- 1 **SPECIALIZED MANUFACTURING FACILITIES**—75-year background, large well equipped plant efficiently tooling to build high production machines.
- 2 **SPECIAL HYDRAULIC EQUIPMENT**—designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.
- 3 **SPECIAL ELECTRICAL EQUIPMENT and CONTROLS**—individually designed and built for maximum safety and ease of control, with circuits that assure the most dependable coordination of all machine functions.
- 4 **SPECIAL GAUGES, FIXTURES, TOOLS**—designed for each individual machining problem, assure accuracy of operations at high production speeds.
- 5 **SPECIAL HANDLING AND CONVEYOR EQUIPMENT**—designed and built to reduce work handling, effect maximum safety and efficiency.
- 6 **COORDINATED DESIGN AND ENGINEERING**—Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.



1

Barnes 11-Station Progress-Thru Machine completes drilling, tapping, and milling operations on the 4 and 6-Cylinder Diesel Engine Blocks. Bushing plates, guide rails, head stops, transfer pusher fingers, and other machine components are quickly adjustable to handle both block sizes.



*Builders of  
Better Machines  
Since 1872*

**Multiple Spindle Drilling • Boring**



Machinery, November, 1957

CENTER OF MACHINE-TOOL EXCELLENCE

**ROCKFORD, ILLINOIS, U.S.A.**



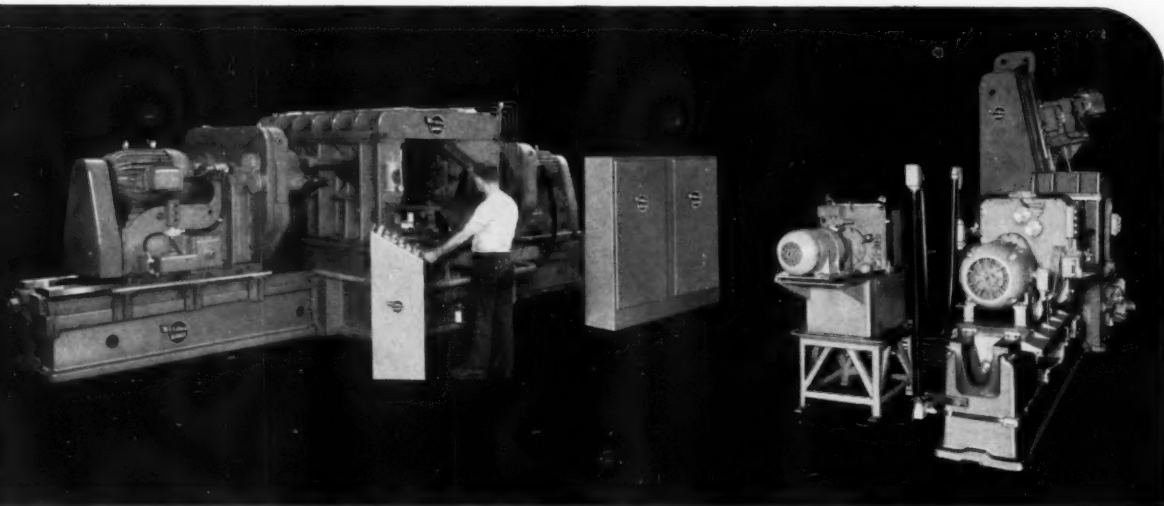
## • MACHINE BOTH 4 AND 6 CYLINDER ENGINE BLOCKS

much of the tooling is common to both block sizes and does not require changing. Bushing plates, guide rails, head stops, and transfer pusher fingers quickly and easily adjust to accommodate for variations in the two block designs. Where tooling changes are required, easy accessibility and quick conversion and set-up features speed the change-over.

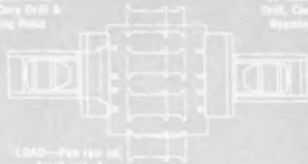
### OVER 75 YEARS OF MACHINE TOOL BUILDING EXPERIENCE

This unusual application is only one of many produced by Barnes . . . the result of over 75 years of accumulated knowledge in the highly specialized machine tool field. Creative skills, plus complete and extensive building facilities, assure you of machines possessing maximum capability for lowering production costs and improving product quality.

ASK FOR AN ANALYSIS OF YOUR PRODUCTION METHODS . . . YOUR PROBLEMS WILL RECEIVE EXPERT AND INDIVIDUAL ATTENTION



31-Spd. Horiz.  
Drill, Core Drill &  
Boring Head



35-Spd. Horiz.  
Drill, Core Drill &  
Reaming Head

Single-Spd. Boring  
Head



2

Barnes Special 4-Station Progress-Thru Machine completes drilling, boring, and reaming on the blocks. Here again, adjustable features are built in to compensate for the two block sizes. Electrical interlocks on these machines prevent accidental tool damage during change-over. Idle stations are included for future tapping operations.

3

Special 3-Way Cam and Crank Boring Machine precision bores both block sizes. Adjustment features are similar to the preceding machines. All units are electrically controlled for automatic cycle sequence with push-button operation.

*Write Today* FOR YOUR COPY  
of "Coordinated Machine Engineering"—  
a 32-page booklet of automation equip-  
ment ideas.



**W. F. & JOHN BARNES COMPANY**

**402 SOUTH WATER STREET, ROCKFORD, ILLINOIS**

*Tapping Machines • Automatic Progress-Thru and Transfer Type Machines*

Machinery, November, 1957

FOR PRODUCTION MACHINE TOOLS IT'S **ROCKFORD, ILLINOIS, U.S.A.**



## "Engineered Production" Service

FOR BROACHING



### American's "Engineered Production" Service

... gives the broach user the complete three part service that is essential to obtain the most practical broaching method. Years of design and production engineering experience, unavailable at any price, are effectively added to your staff at no extra cost.

**THE JOB** — Broaching the I.D. and four inverted angular helical splines in automotive synchronizer rings.

**THE RESULT**—Two parts are broached at a time in a fully automatic cycle for a total production of 376 pieces per hour.



# It takes

# all 3

# 1

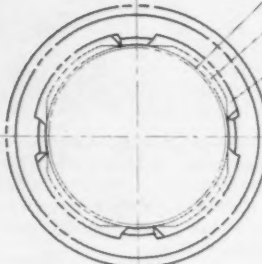
## PROPER BROACH TOOL DESIGN

Top quality results on any broaching operation require starting the job with design of the broaching tool itself. American Broach solves this all-important first step by considering stock removal, length and width of cut, finish, tolerances required, etc. Because broach and machine are designed as a team, high quality work and long tool life result. In this job, the broaches which are rotated by a spiral lead bar, are pulled through the parts. Special automatic broach pullers with long shanks and drive keys are geared to the spiral lead bar.

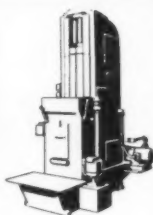


### DEVELOPMENT OF CUT

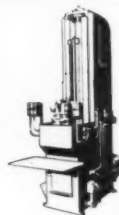
1. ROUND TEETH FINISH MINOR DIAMETER
2. OD. PROGRESSION DEVELOPS ANTI-SKID FLATS
3. FINAL OD PROGRESSION AND DEVELOPMENT OF INVERTED SPLINES



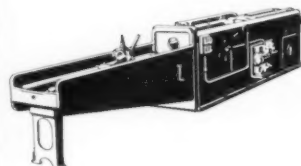
Broaching Tools



Three Way



Single Ram



Horizontal



Machinery, November, 1957

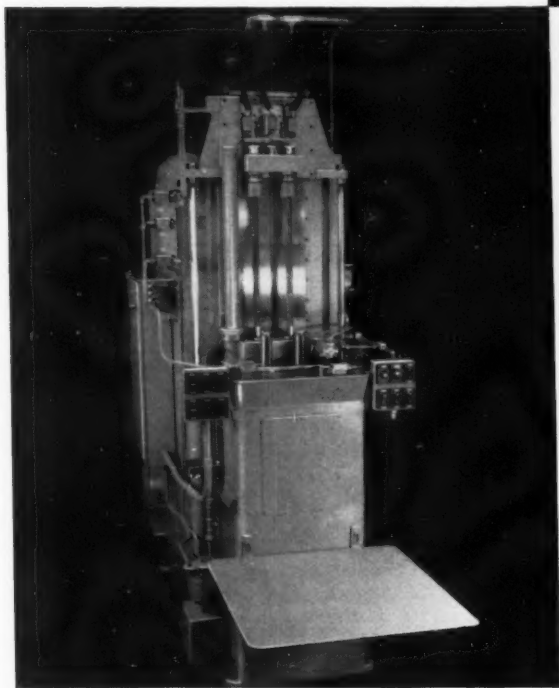
CENTER OF MACHINE-TOOL EXCELLENCE

**ROCKFORD, ILLINOIS, U.S.A.**

# to give you peak broaching performance

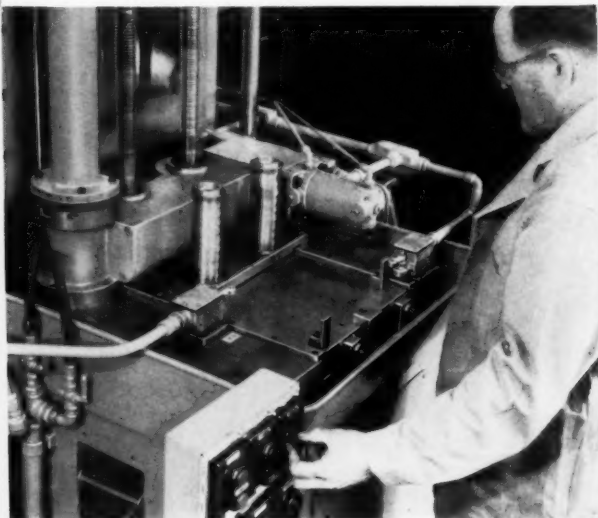
## 2 SPECIFYING THE RIGHT MACHINE

Production rate required, length and speed of stroke, relationship to other production machinery, available floor space, etc., determine the selection of the broaching machine capable of doing the best job. Machine selection follows design of the broaching tool at American, insuring the most practical method. This American two-station pull down machine has a spiral drive unit, consisting of a lead bar and stationary nut geared to a two-station broach puller unit.

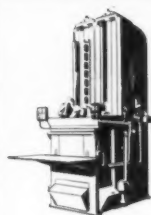


## 3 EFFICIENT FIXTURING

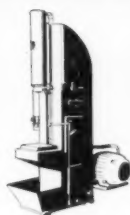
Whatever your parts geometry or hourly needs, fixturing by American Broach forms the vital third link in the production chain. On this job, operator only has to fill the feed tubes. After broaching, the slide returns to out position and a subslide opens, allowing the finished parts to drop into the discharge chute. Operator skills are not a limiting factor in production since the "skills" are built into the tool, machine, and fixtures.



Get more facts in American's Pull Down Bulletin A620. Write for your free copy today.



Duplex Ram



Presses



**American**  
**BROACH & MACHINE DIVISION**  
SUNDSTRAND MACHINE TOOL COMPANY  
ROCKFORD, ILLINOIS

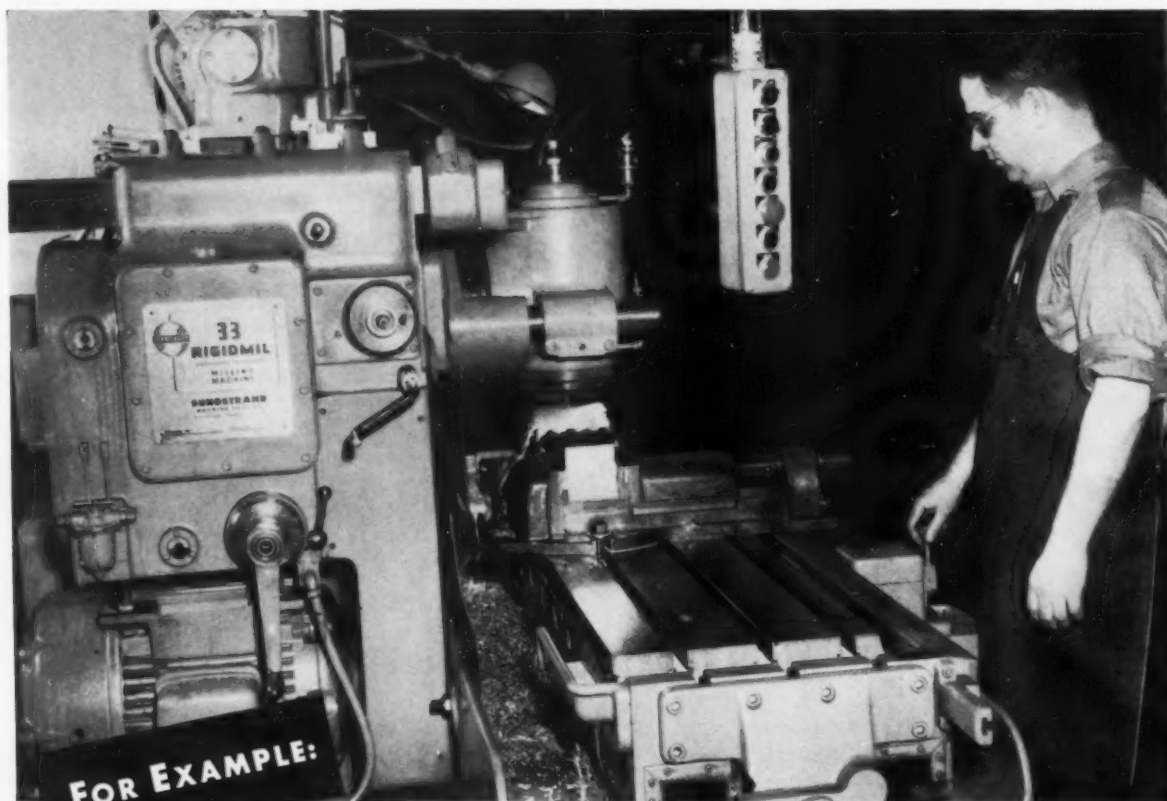
Machinery, November, 1957

FOR PRODUCTION MACHINE TOOLS IT'S

**ROCKFORD, ILLINOIS, U.S.A.**



# Before you buy any milling equipment see what you get from **SUNDSTRAND!—**



## **This Rigidmil increased production 50% on small lot jobs**

This Sundstrand Rigidmil increased production 50% over former machining methods on hard to machine parts run in small lots. In addition to the increased production, setup time was reduced considerably in face milling extremely tough stainless steel rough forgings for junction blocks used in welding equipment. High horsepower, rigidity, automatic cycles, and the wide range of speeds and feeds of this Rigidmil are all cited as reasons for this substantial production increase.

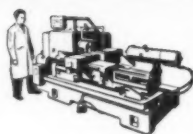
Your job may be like this one or differ in most respects, but, in either case, you can benefit from Sundstrand "Engineered Production." Sundstrand's years of production engineering experience on small, medium, or high production jobs combined with the availability of a complete range of milling machines means you can be sure of getting the machine and tooling that are best suited to your specific job needs.

Sundstrand's record of meeting, and often exceeding, exacting production standards in hundreds of automotive, aircraft, farm equipment, construction machinery, and railroad equipment plants is your assurance that you will obtain the most practical machining method. Send a sample part or print and your production requirements to Sundstrand for an "Engineered Production" analysis.

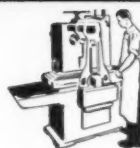


*"Engineered  
Production"  
Service\**  
\*REG. U.S. PAT. OFF.

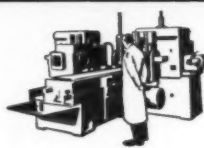
**AUTOMATIC LATHES**



**SIMPLEX RIGIDMILS**



**DUPLEX RIGIDMILS**



Machinery, November, 1957

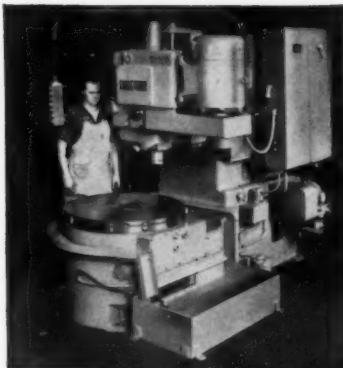
**CENTER OF MACHINE-TOOL EXCELLENCE**

**ROCKFORD, ILLINOIS, U.S.A.**



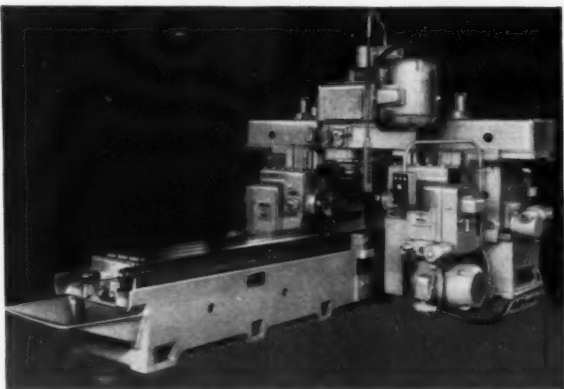


On these pages are several basic Rigidmil designs that, together with Sundstrand "Engineered Production," will give outstanding results on your job. Numerous other combinations of machines, tooling, and heads (both standard and special) offer an almost unlimited number of combinations to meet the *exact* needs of every job.

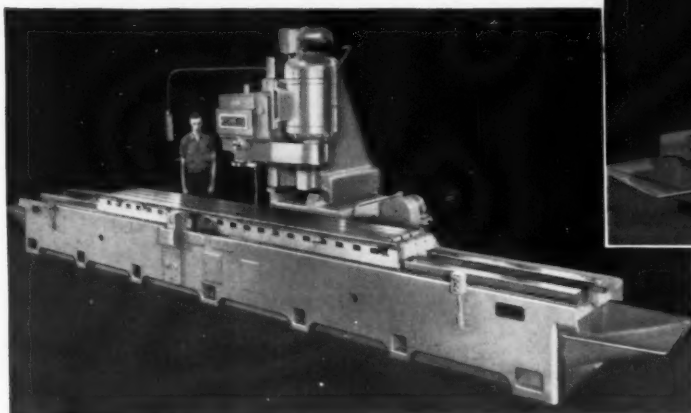
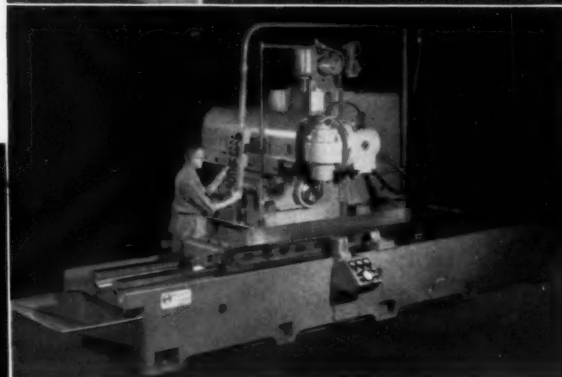
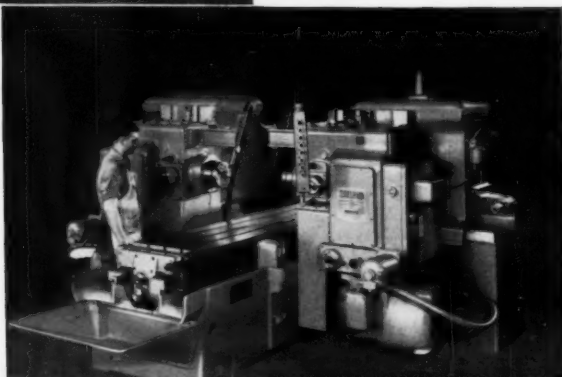


**ROTARY TABLE RIGIDMILS**—Way-type cross adjustment of spindle head carrier and way-type vertical adjustment to spindle head provide maximum support to cutter for large or small parts.

**DUPLEX RIGIDMILS**—Fixed or adjustable column types enable opposed faces to be machined with maximum accuracy and economy. Adjustable column machines mount spindle heads on movable columns for cutting rigidity over wide work range.



**TRIPLEX RIGIDMILS**—Flexibility for handling both wide and narrow parts with no sacrifice in accuracy; three spindle heads—one vertical and two horizontal with individual motor drives—are among the advanced design features offered.



**UNIVERSAL RIGIDMIL**—Recent addition to Rigidmil line, the universal bed-type machine has both a horizontal spindle head and an all-angle, ram type head, making possible wide range of cuts at all angles.

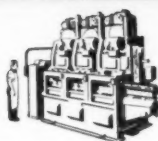
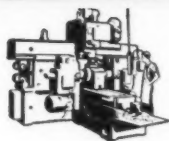
**VERTICAL RIGIDMILS**—Power vertical adjustment to spindle head, endwise quill adjustment, and cross adjustment to spindle head carrier are features contributing to easy adjustment and simple setup over a wide work range.

Additional Facts on how "Engineered Production" is applied to the complete line of Sundstrand Machine Tools is available in Bulletin 685. Write for your copy today.



**TRIPLEX RIGIDMILS**

**SPECIAL MACHINES**



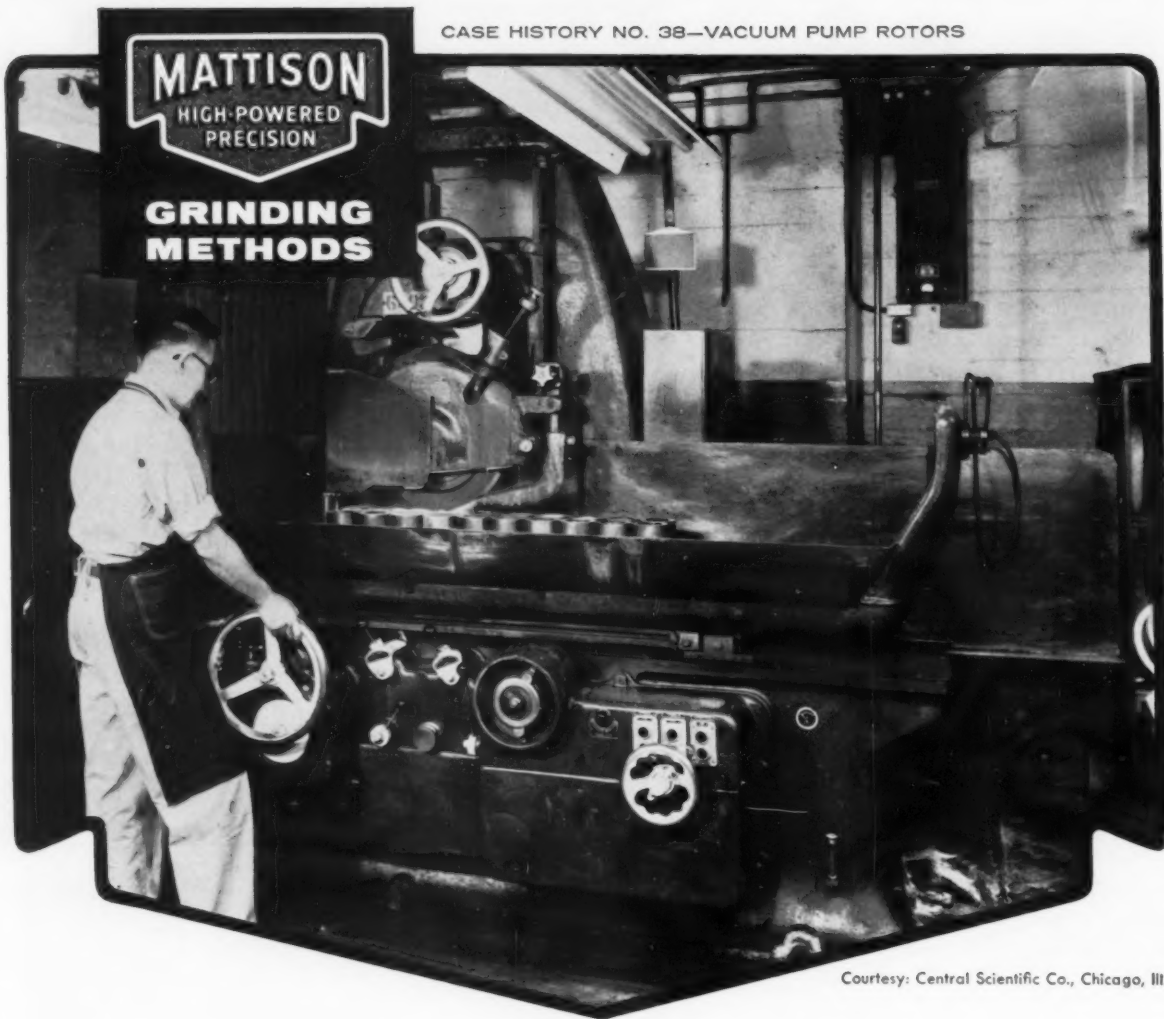
**SUNDSTRAND**  
**Machine Tool Co.**

2530 Eleventh St. • Rockford, Ill., U.S.A.

Machinery, November, 1957

FOR PRODUCTION MACHINE TOOLS IT'S **ROCKFORD, ILLINOIS, U.S.A.**





Courtesy: Central Scientific Co., Chicago, Ill.

## Switch to Mattison surface grinder doubles output ... consistent accuracy speeds assembly



Finishing vacuum pump rotors in quantity on Mattison grinder doesn't require parts-holding fixtures. Rotors are held by magnetic table.

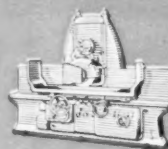
Not only is output doubled, but improved accuracy being achieved on this Mattison high-powered precision surface grinder enables rotors for high vacuum pumps to be assembled more rapidly. Production now is 50 parts per hour compared to 12 to 25 per hour with former grinding method.

Stock removal on this job is .0015 inch with a high degree of accuracy required. Both parallelism and flatness are held to .0003 inch to assure consistent pump performance at very low pressures.

Greater accuracies also are being realized in machining a wide variety of other scientific apparatus parts. Very thin vanes for another vacuum pump, previously ground one at a time, are now ground in production lots. Reproducibility is greatly improved.

Like every Mattison grinder, this horizontal spindle unit features high horsepower and rigid construction—the design combination that means ability to handle a wide range of work with unmatched accuracy at high production rates.

**IF IT'S A FLAT SURFACE  
THERE IS A MATTISON  
TO GRIND IT**



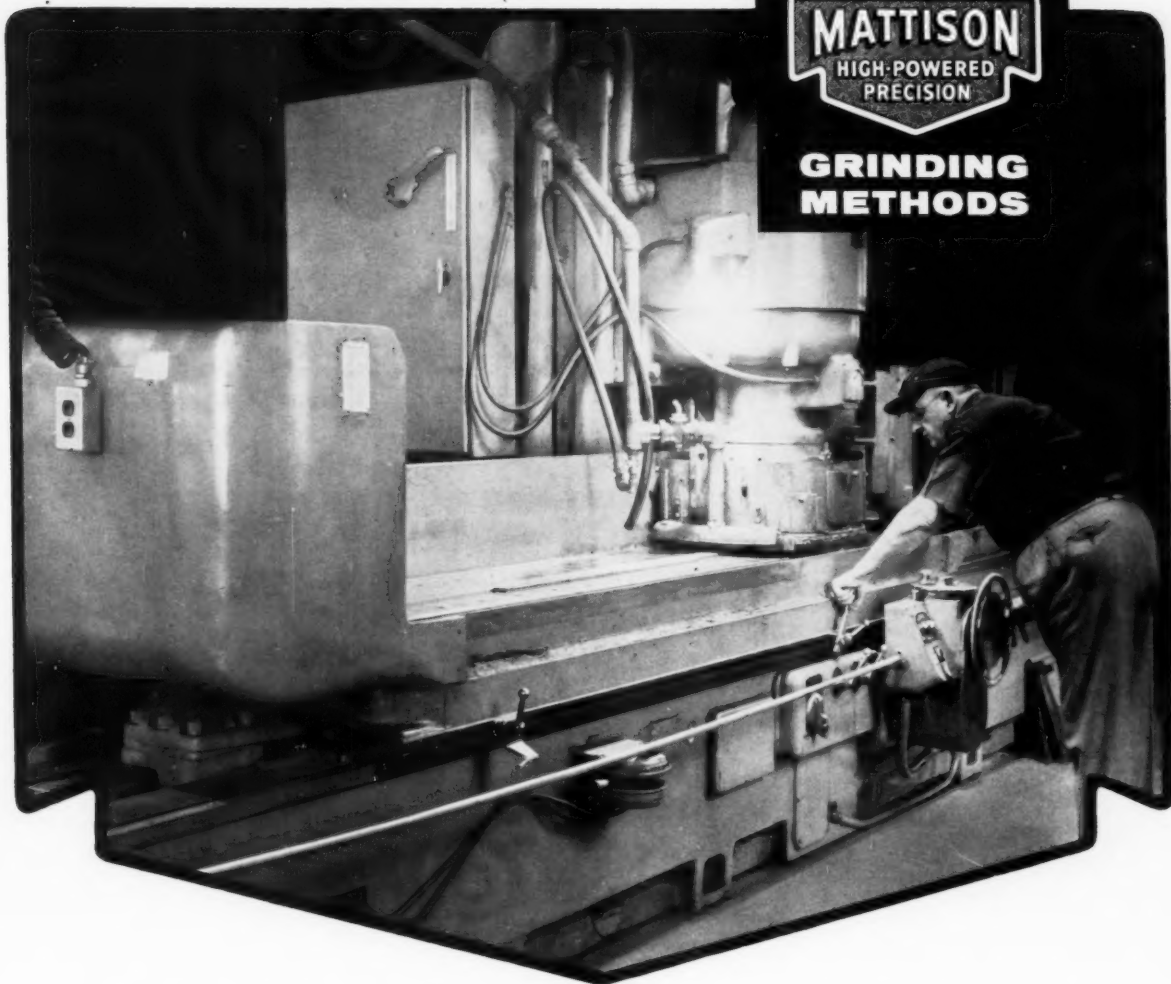
Machinery, November, 1957

CENTER OF MACHINE-TOOL EXCELLENCE

**ROCKFORD, ILLINOIS, U.S.A.**



## GRINDING METHODS



### Switch from planers to Mattison Grinder cuts setup time, boosts production 350 per cent!

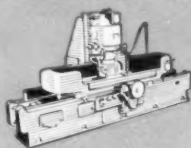
Here's how high-powered surface grinding on a "Mattison" cuts costs in the plant of a large midwestern manufacturer of precision tools.

Broach inserts, formerly planed, are now ground on the Mattison No. 400 Vertical Spindle Reciprocating Table Surface Grinder. Production has been increased because this heavy, powerful machine removes so much stock, milling time has been reduced. Former production was 200 inserts per week on the planers—today inserts are ground at the rate of 700 per week (a 350 per cent boost). Whereas setup time was 45

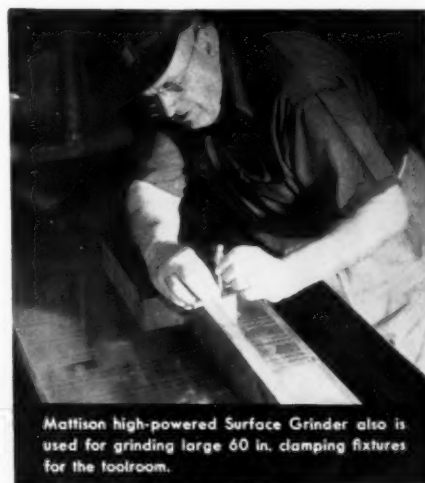
minutes per load, today it takes only 15 minutes to set up and grind 20 pieces.

Mattison Grinders speed production because their rigid, one-piece column construction and high horsepower permit heavy stock removal. The wheel head holds its adjustment, yet can be tilted easily and quickly for the individual job. This assures flexibility for handling a wide range of work.

Check savings available in your plant by sending parts to the Mattison Methods Laboratory for free sample grind and production estimate. Your Mattison dealer will make all the arrangements.



HIGH-POWERED  
PRECISION  
SURFACE  
GRINDERS



Mattison high-powered Surface Grinder also is used for grinding large 60 in. clamping fixtures for the toolroom.



get this new story on...



ROCKFORD ECONOMY

# LATHE

A complete description of this modern, medium-sized, economy-priced lathe designed with . . .

**SPEEDS FOR CARBIDES**

**RIGIDITY FOR HIGH PRODUCTION**

**ACCURACY AND FLEXIBILITY FOR TOOLROOM USE**

**16" AND 18" SWING**

## ROCKFORD ECONOMY LATHE

*a rigid, powerful, accurate lathe*

**In a medium-sized, economy-priced class**

The Rockford Economy Geared Head Lathe is designed to fill a specific demand for a medium priced lathe of sufficiently heavy construction to stand up under general production and maintenance use, while providing the accuracy needed for the tool room. Its dimensions are ample and it is powered for use with carbide tools. High quality materials are used liberally and judiciously in its construction. This lathe is built by expert machine tool mechanics in an economical quantity production line.

The Rockford Economy Lathe has a big, accurate lead screw, uninterrupted by keyways, an independent head shaft with interlocking safety clutch, a handy thread cutting dial as standard equipment, double wall apron, drop lever feed engagement and every mounted of a first-class lathe. The geared head has 15 easily obtained speeds. Headstock shaft and spindle run in Timken precision bearings.

Read our guarantee and check the specifications. Buy Rockford Economy Lathes for real economy in turning operations.

5 or 7 1/2 horsepower drive motor

quad-v-belt drive

hardened and ground bedways

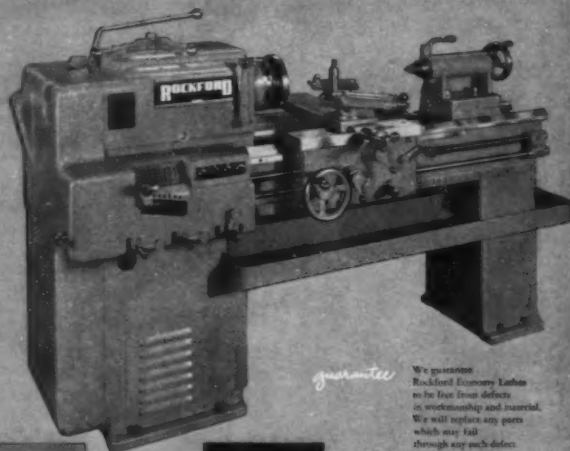
all-geared head

separate lead screw and lead shaft

MEDIUM-SIZED  
ECONOMY PRICED

speeds for carbides

16" Rockford Economy Lathe may be equipped with the Rockford Hydraulic Copy-Kat Tracer Control as extra equipment. See Bulletin 1003 for full details.



*guarantee*

We guarantee Rockford Economy Lathes to be free from defects in workmanship and material. We will replace any parts which may fail through any such defect during the period of one year after date of installation.

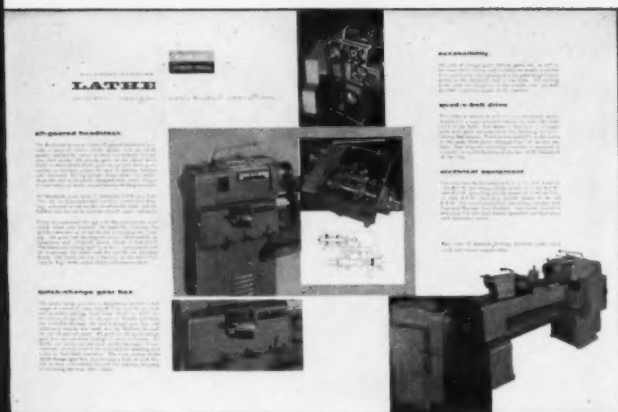


Machinery, November, 1957

MACHINES DESIGNED TO MEET YOUR NEEDS

**ROCKFORD, ILLINOIS, U.S.A.**





This completely new booklet contains photos, description and drawing of the all-geared headstock with quick-change gear box, standard construction features, and description of spindle, carriage, apron and taper attachment, together with a complete list of specifications and extra equipment.

Every methods and process engineer should have a copy for comparison of production and accuracy lathe values. This bulletin also makes it easily apparent how to specify lathes equipped to meet specific production problems through selection of size, feed and speed range, and electrical equipment. Full description is also available on tracer controlled operation with the Rockford Kopy-Kat Duplicator.

**ROCKFORD MACHINE TOOL CO.**  
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

## get a copy - ask your distributor

There's a Rockford Machine Tool Co. representative in your area who will quickly send you a personal copy of this new booklet for reference and file. If you are a methods, process or production engineer, master mechanic or production superintendent drop him a line on your company letterhead, or write us directly for Bulletin No. 904.

represented by:

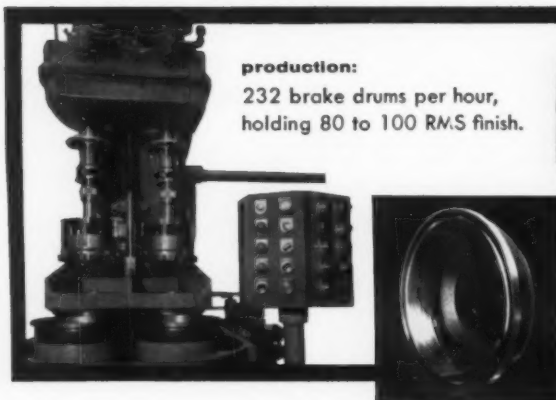
Abell Machine Tool Co.  
2030 Erie Blvd., East  
Syracuse 3, N. Y.  
Austin-Hastings Co., Inc.  
226 Binney St.  
Cambridge 42, Mass.  
B-H-S Machinery Co.  
717 Airport Blvd.  
So. San Francisco, Calif.  
Blackman & Nuetzel Machinery Co.  
3713 Washington Blvd.  
St. Louis 8, Mo.  
Cinrock Machinery, Inc.  
115 Industrial East  
Clifton, New Jersey  
Dawson Machinery Co.  
5700 First Avenue, South  
Seattle 8, Wash.  
Delaware Valley Machinery, Inc.  
2323 Maplewood Ave.  
Willow Grove, Pa.  
Dixie Mill Supply Co., Inc.  
Tchoupitoulas & St. Joseph Sts.  
New Orleans 6, La.  
The Galligher Co.  
545 W. Eighth South St.  
Salt Lake City 10, Utah  
The C. H. Gosiger Machinery Co.  
Bacon & McDonough Sts.  
Dayton 2, Ohio  
Hamilton Machinery Co.  
918 W. Commerce St.  
Dallas 22, Texas  
Jackson-Fotsch Co.  
7350 W. Lawrence Ave.  
Chicago 31, Illinois  
Machinery Sales Co.  
2838 Leonis Blvd.  
Los Angeles 58, Calif.  
McBeth Machinery Co.  
Suburban Square Bldg.  
Ardmore, Pa.  
The Mine & Smelter Supply Co.  
3800 Race St.  
Denver 16, Colo.  
Northern Machinery & Supply Co.  
2001 Washington Ave., South  
Minneapolis 4, Minn.  
Peninsular Machinery Co.  
19178 James Couzens Highway  
Detroit 35, Michigan  
Richards Machinery & Supply Co.  
200 Edwards St.  
Shreveport 98, La.  
G. A. Richey & Sons  
P. O. Box 6067  
Indianapolis 20, Ind.  
J. H. Ryder Machinery Co., Ltd.  
360 Evans Ave.  
P.O. Box 36  
Toronto 14, Ontario, Canada  
Scott Machine Tool Co.  
411 Williams St., N. W.  
Atlanta 8, Georgia  
Smith-Courtesy Co.  
Seventh & Bainbridge Sts.  
Richmond 11, Va.  
Wm. K. Stamets Co.  
Jenkins Arcade Bldg.  
Pittsburgh 22, Pa.  
Wessendorff, Nelms & Co.  
5535 Harvey Wilson Drive  
Houston 13, Texas  
Wisconsin Tool & Machine Co., Inc.  
6520 West North Ave.  
Milwaukee 13, Wis.



# BARNESDRIL

**special honing tool**  
answers unique finishing problem

- removes taper
- corrects out-of-roundness
- applies selected finish



**production:**  
232 brake drums per hour,  
holding 80 to 100 RMS finish.



Barnesdril Special Blind-End Honing Tool with  
Adjusting Head utilizing Plas-T-Clad stones.

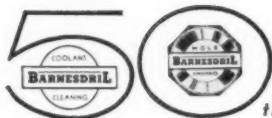
For the first time it is possible to remove taper, correct out-of-roundness and apply a honed finish, all in one operation. The honing tool that does all these things has been developed by Barnesdril engineers, specifically for a brake drum manufacturer.

The drums represent a blind end bore of 11" in diameter and 2 1/4" deep. In order to reproduce the specified requirements, Barnesdril engineers designed a special honing tool, Model HFB-8. This tool is a Special Blind End Lever type honing tool, utilizing eight clamp-type stones. The tool removes .003" to .005" stock from the sides of the brake drum. The finish is held between 80 and 100 RMS and the bore is honed diametrically straight.

Two of these tools are mounted on a 2-Spindle Ram Type Machine that provides a positive stop and dwell for blind end honing. Final production is 232 drums per hour.

**custom-honing service** for special short-run applications.

Send us your short-run pieces, with specs and finish requirements for prompt honing by expert technicians.



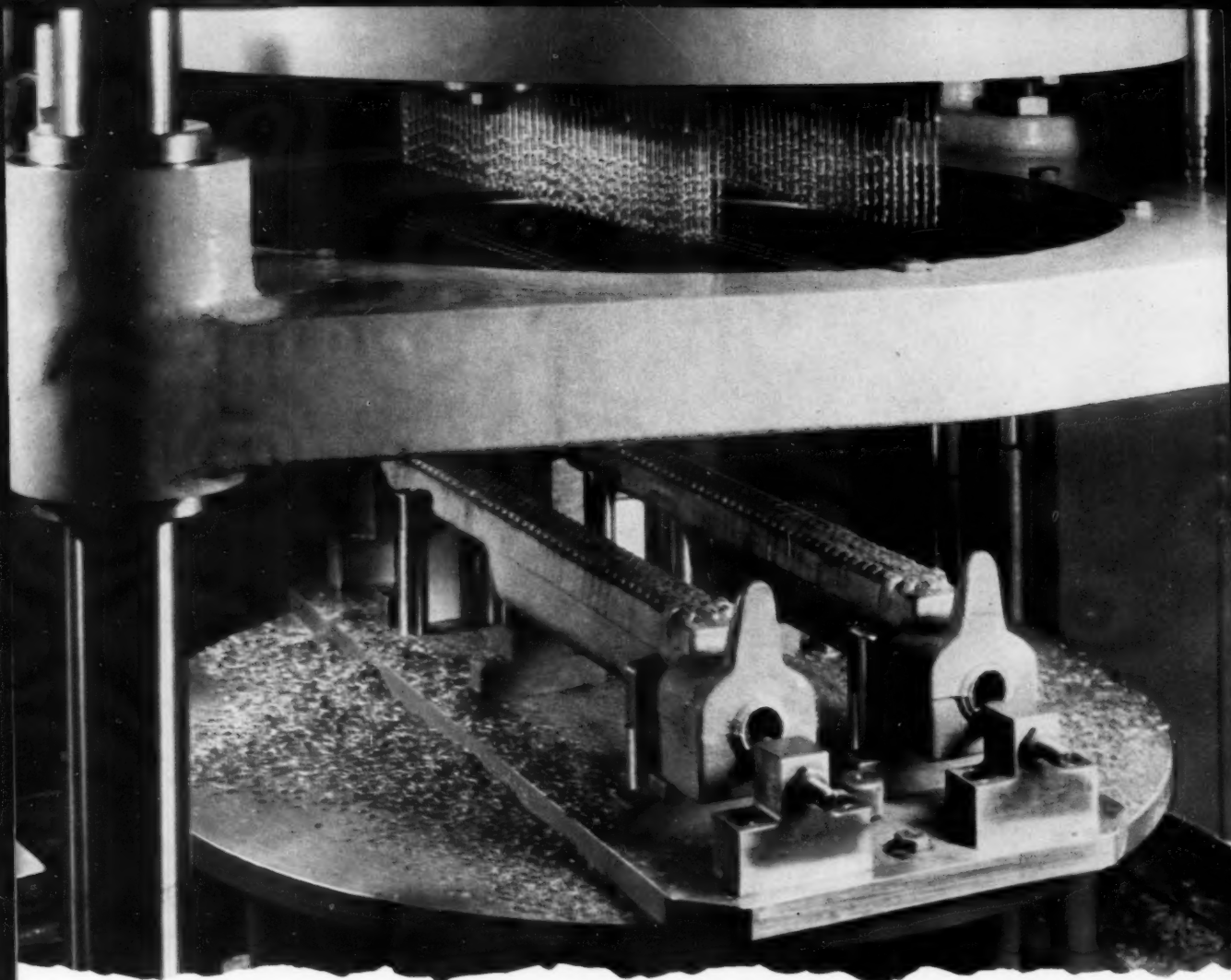
th year

## BARNES DRILL CO.

820 CHESTNUT STREET • ROCKFORD, ILLINOIS  
DETROIT OFFICE: 3419 South Telegraph Road



MACHINES DESIGNED TO MEET YOUR NEEDS **ROCKFORD, ILLINOIS, U.S.A.**



Uniform quality  
and high performance of  
**CLE-FORGE High Speed Drills**  
can help you reach  
production quotas

## **COSTLY "DOWN TIME" REDUCED!**

● You can keep your drilling operations *on schedule* with CLE-FORGE High Speed Drills. These fine quality tools give superior performance on *every set-up* . . . and you can rely on their *uniformity* day after day, month after month, year after year.

◆ Why not ask a Cleveland Service Representative for suggestions on reducing "down time" and increasing production in *your* shop? Contact our nearest stockroom, or . . .

**TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR**



**THE CLEVELAND TWIST DRILL CO.**

1242 East 49th Street • Cleveland 14, Ohio

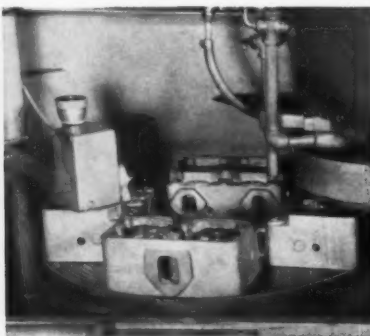
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5 • Los Angeles 58

E. P. Barrus, Ltd., London W. 3, England

# Whatever your grinding job may be...



200 adjusting screw washers are ground on one side in one hour. Stock removal .025"; limits  $\pm$  .001".



Tops of cylinder heads ground 21 per hour; stock removal 3/16" to 1/4". Bottoms 55 per hour; stock .012"; limits  $\pm$  .001".

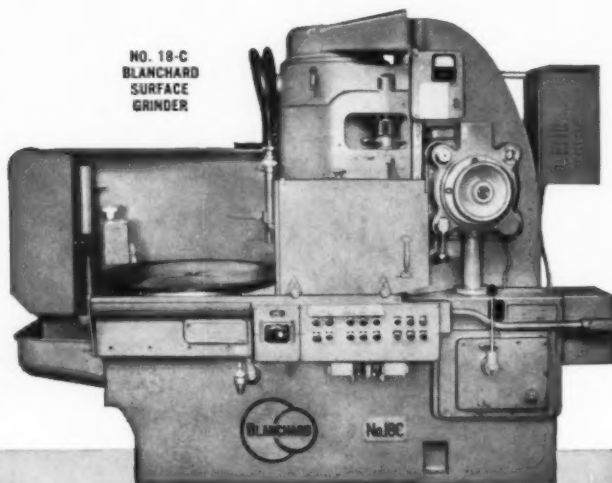


56 cast iron plates are ground on one side in one hour. Stock removal .140"; limits .001".

## for best results...

The Blanchard No. 18-C Surface Grinder has the speed and precision that guarantees economical grinding on an endless variety of jobs. After the initial setup, the automatic cycle handles every operation from start to finish. The operator is freed to prepare the next load or to operate a second No. 18-C Grinder.

## Put it on the Blanchard



NO. 18-C  
BLANCHARD  
SURFACE  
GRINDER

### The 18-C Automatic Cycle...

Moves chuck to grinding position and starts it rotating

Starts wheel rotation and coolant pump

Provides rapid wheel approach to work

Engages power down-feed at preset rate

Changes to fine feed just before finished size is reached

Stops feed when work is to size — "sparks" out. Raises wheelhead

Stops wheel, coolant pump, and chuck

Moves chuck to loading position — demagnetizes chuck

Can be changed quickly to manual operation

**Automatically Controls Size!**

Send today for your free copy of 18-C folder.



## THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.



# Completely Oil-Sealed!

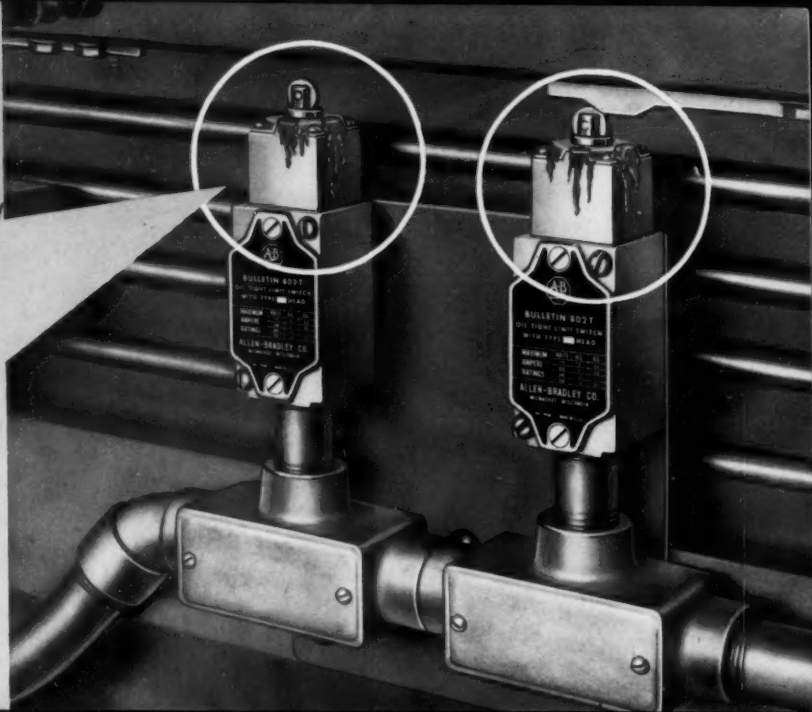


## SEALED HEAD KEEPS OUT OIL, COOLANT, METAL CHIPS ...your guarantee of reliable limit switch operation!

With *completely sealed* operating heads, as well as sealed switch bodies, Allen-Bradley Bulletin 802T oiltight limit switches provide maximum reliability in limit switch operation for your modern, high speed production machines. The sealed head excludes oil, dirt, and metal chips from the operating mechanism... the spring return, momentary contact operators cannot become sluggish and stick.

The maintenance free, double break, silver alloy contacts are sealed in the oiltight body. Interchangeable operating heads are available with various push rods and levers which can be mounted in any one of four positions. Oiltight transparent plastic covers, for inspecting wiring without removing the cover, are available for most units.

Here's a line of *quality* limit switches in which each type will provide millions of trouble free operations. Have your A-B control engineer acquaint you with this latest development—another advance in limit switch design.



802TC Side Push Rod Type



802TF Rod Type



802TA Roller Lever Type



802TB Top Push Rod Type with Plastic Window



802TAO Roller Lever Type for Cavity Mounting



802TG Adjustable Roller Lever Type

# ALLEN-BRADLEY

MOTOR CONTROL

QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.  
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

11-57-MR

# NOW... ALLEN-BRADLEY PRECISION-TYPE LIMIT SWITCHES ARE ALSO *OILTIGHT!*



## OILTIGHT HEAD

Newly designed head on push type seals out oil. Roller lever types have sealed operating shafts.

## OILTIGHT BODY

Synthetic rubber gasket between housing and plate excludes oil and coolant from operating mechanism.

Allen-Bradley precision-type limit switches combine very close operating tolerances with such a sturdy construction that they can be used for any industrial application. Now this line of limit switches has been further improved by making them completely oiltight.

Especially designed for use where the motion to operate the limit switch is measured in thousandths of an inch, these Allen-Bradley limit switches can henceforth be employed in applications where oils, coolants, and dust are present.

Allen-Bradley Bulletin 802 oiltight precision limit switches have a positive snap action mechanism which prevents any possibility of a "dead center" ... no matter how slowly the actuating force is applied. They are available in both the spring return and maintained contact construction. And all have maintenance free, silver alloy contacts.

Specify these Allen-Bradley oiltight limit switches where "precision" operation is required and where dirt and oil could cause trouble.



Push rod type. Plastic cover, for inspection without removing cover, made for most units.



Roller lever type limit switch with lever on right side. Also available with lever on left side.



Roller lever precision-type limit switch with roller lever in front of the switch body.

## ALSO—GENERAL PURPOSE LIMIT SWITCHES

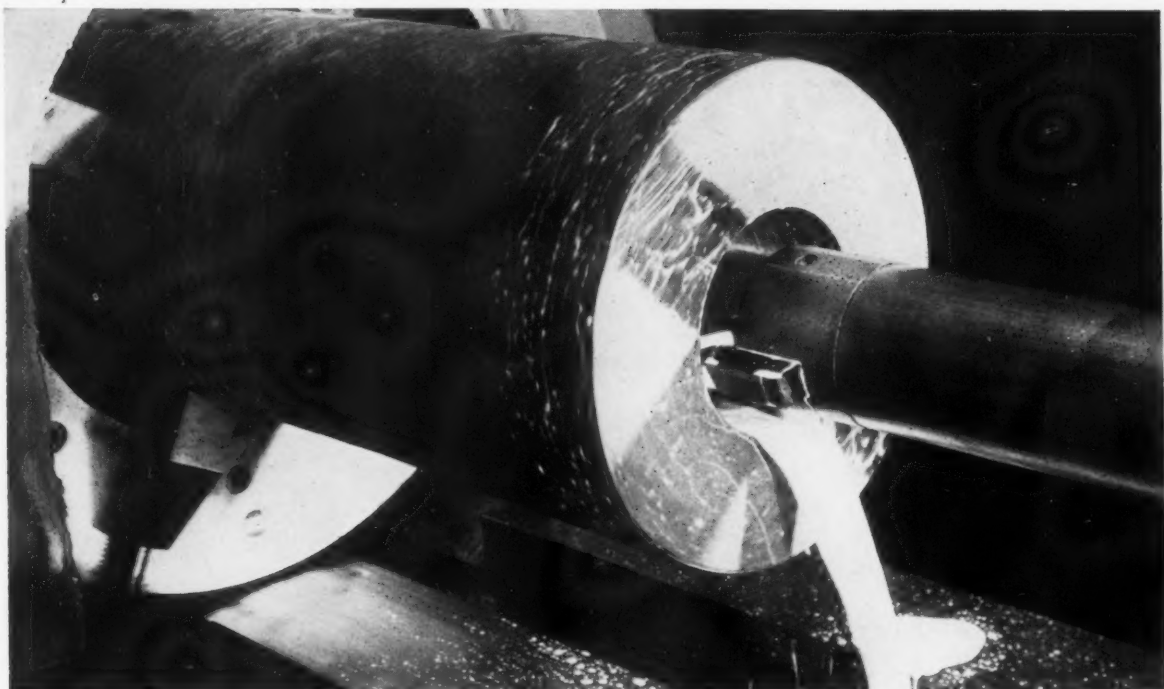


Bulletin 801 general purpose limit switches in standard or heavy duty ratings. Maintained or momentary contacts with slow or snap action. Silver alloy contacts used throughout this line.

**ALLEN-BRADLEY**  
**MOTOR CONTROL**  
QUALITY

Allen-Bradley Co.  
1316 S. Second St., Milwaukee 4, Wis.  
In Canada—  
Allen-Bradley Canada Ltd., Galt, Ont.





## Finish boring is your first step with Timken® seamless steel tubing —the hole's already there!

**Y**OU save time and money when you make hollow parts with Timken® seamless steel tubing instead of bar stock. You eliminate drilling because the hole's already there. Finish boring is your first production step. With less metal to machine away you get more parts per ton of steel.

And because Timken seamless steel tubing eliminates one boring operation, your screw machine stations are free for other jobs. You get more machining capacity without adding machines.

And you get a better quality finished product with Timken seamless steel tubing because of the way we

make it. A solid round is forged over a mandrel, thoroughly working the metal inside and out. This rotary piercing operation gives Timken seamless steel tubing its fine forged quality, uniform spiral grain flow. With exacting control of temperature and piercing speed, we maintain this quality from tube to tube, heat to heat, order to order.

And to further increase your steel savings, Timken Company engineers will be glad to recommend the most economical tube size for your hollow parts job. You'll get a size guaranteed to clean up to your dimensions. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO".

# TIMKEN *Fine Alloy* STEEL

TRADE-MARK REG. U. S. PAT. OFF.

**SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING**

See the next Timken Televent hour, "The Innocent Years" over NBC-TV, Thursday night, November 21st.

For more information fill in page number on Inquiry Card, on page 221

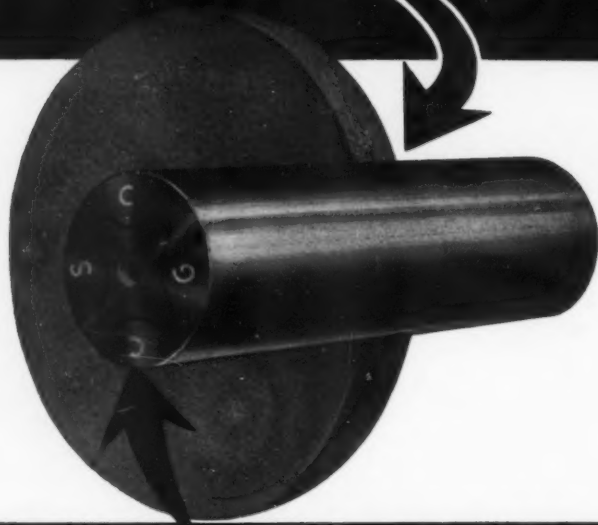
MACHINERY, November, 1957—93

# An exclusive GRINDING PROCESS...

makes

## CUMBERLAND STEEL BARS

concentric, straight,  
smooth & really accurate



BE SURE OF THIS MARK ON THE END OF YOUR SHAFTS

## CUMBERLAND GROUND BARS FOR ALL TYPES OF MACHINES

They are carefully ground to our standard manufacturing tolerance, plus nothing to minus .002" on diameters 1-1/8" to 2-7/16" inclusive . . . plus nothing to minus .003" on diameters 2-1/2" to 8" inclusive. Closer tolerance can be furnished, if desired. And, remember, Cumberland Steel Bars are the end result of 109 years' experience,—and every bar is *carefully tested* before shipment. The list of Cumberland's customers reads like the "Blue Book" of Industry. Ask for further information.

### MANUFACTURED IN THREE SPECIFICATIONS

Cumberland Brand—AISI C-1020/C-1025, Elastic Limit 30,000# Min.

Potomac Brand—AISI C-1040, Elastic Limit 45,000# Min.

Cumsco Brand—AISI C-1141, Elastic Limit 57,000# Min.

# CUMBERLAND STEEL COMPANY

CUMBERLAND, MARYLAND, U.S.A.

ESTABLISHED 1845

INCORPORATED 1892





# Tool Steel Topics



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.



## Lustre-Die Takes High Polish For Molding Plastic Rattles

Shreve Molded Products, Youngstown, Ohio, needed an injection mold for the production of heart-shaped parts for baby rattles, using acetate and styrene plastics. They wanted a mold capable of taking a high polish, so as to produce unusually attractive parts. In addition, the mold had to have the stamina to perform economically during long production runs.

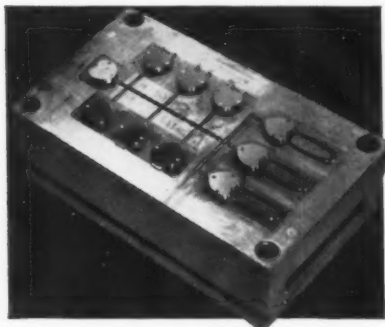
The problem was put up to Leed Steel Co., Buffalo, N. Y., Bethlehem's local tool

steel distributor. Their recommendation was Lustre-Die tool steel. It proved to be an excellent choice, too, for the mold, which was produced by Tri-Penn Tool Co., Erie, Pa., has been satisfactory in every way.

Lustre-Die is ideal tool steel for producing plastic parts because its properties enable it to take an unbelievably bright, mirror-like polish. Not only does Lustre-Die have the proper basic analysis for working with plastics—we even go a step beyond that by adding alloy fortification. We also build up the steel's excellent properties by oil-quenching and tempering, so that it can be furnished ready for machining and polishing.

Lustre-Die is made in the electric furnace, and is carefully inspected to insure cleanliness. It has a minimum of inclusion-causing additions. Besides, modern inspection methods hold injurious porosity to the minimum.

If you have any questions about Lustre-Die, or if you would like to give it a trial run, your Bethlehem tool steel distributor will be pleased to assist you.



## BETHLEHEM TOOL STEEL ENGINEER SAYS:

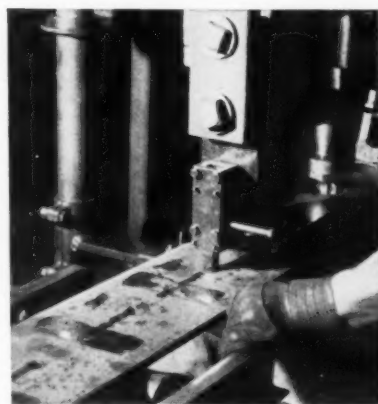


*It Pays to Keep Tools Sharp*

In many shops, resharpening of production cutting tools is sadly neglected. In an effort to keep output high, too many tools are kept in use beyond the point where the cutting edges become excessively dull.

What happens when edges are dull? The dull edges cause an increase in the service load of the shearing or cutting operation. If the dullness is carried to extremes, tools break. Dull edges also produce rough surfaces on the parts, which may lead to rejections due to defects, or because the permissible tolerances have been exceeded.

Should resharpening be delayed too long, it may be impossible to recondition a tool properly, as deep spalls, cracks and gouges cannot be removed. Usually there is an economic balance point where it is best to resharpen, and for each operation this should be determined in advance. Tools should also be inspected regularly, to prevent excessive dulling. Intelligent use of preventive maintenance of cutting edges can work wonders in providing longer tool life and fewer broken tools.

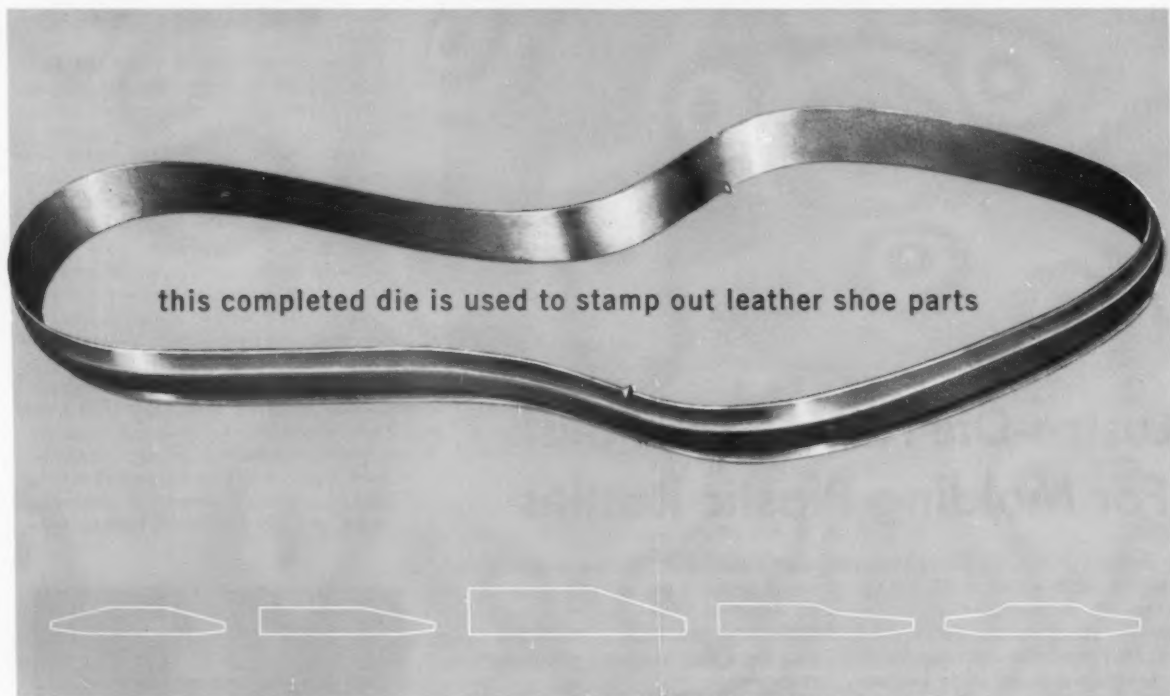


### Bearcat Puts Square Holes in 1/2-in. Plate

In this operation, photographed at Frink Sno-Plows, Inc., Clayton, N. Y., Bethlehem Bearcat is putting 11/16-in. square holes in carbon-steel plate, used as cutting edge of snow plows. Though the steel plate is 1/2 in. thick, the average life of each punch is 5500 holes.

# CHOOSE CRUCIBLE COLD ROLLED CLICKER DIE STEELS

FOR CLOSE TOLERANCES—FINE FINISH



this completed die is used to stamp out leather shoe parts

Crucible clicker die shapes are cold rolled for better finish, closer size tolerances and minimum decarburization. And their thinner edges require less grinding and filing to complete the die.

What's more, *closely controlled* electric melting gives Crucible alloy clicker die steels maximum toughness, combined with just the right hardness after heat treatment. Edges *stay* sharp, yet are easy to file.

Does one of the basic shapes shown fit your exact needs? Or do you require a similar shape in carbon or alloy steel for this or other applications? In either case, you'll find reliable delivery, and helpful service, when you order through your nearby Crucible Branch. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

*For shapes and details send for Clicker Die Information Sheets.*

**CRUCIBLE**

first name in special purpose steels

**Crucible Steel Company of America**

# **SHELBY SEAMLESS TUBING**

## **helps "Pole-Master"\***

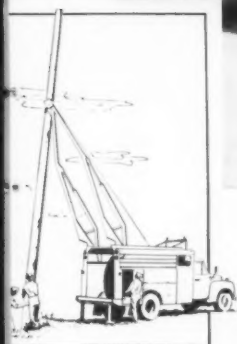
### **handle poles like matchsticks**

THE POWERFUL, two-legged boom of this "Pole-Master" Hydraulic Derrick is made of cold drawn tubes of USS Shelby Seamless Mechanical Tubing. Capable of handling poles up to 75 feet in length with relative ease, the boom is activated by two hydraulic cylinders, also of Shelby Seamless, which are powered by a heavy-duty hydraulic pump. The derrick has an operating arc of more than 180 degrees, and is designed to "set" poles or "pull" them from the ground. The "Pole-Master" can be used under the most severe work conditions in any weather or climate.

Here is an application in which Shelby Seamless Tubing really excels, for it brings into play all the desirable qualities that Shelby Seamless possesses—high strength, uniformity, shock absorbency, dimensional accuracy, lightness and workability.

Produced to exacting standards by the world's largest manufacturer of tubular steel products, Shelby Seamless is available in a wide range of diameters, wall thicknesses, various shapes and steel analyses. You are invited to call on our engineers for assistance. They will be happy to submit recommendations based on a study of your particular requirements.

\*Manufacturer's name on request.



**NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.**  
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

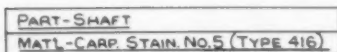


# **SHELBY SEAMLESS MECHANICAL TUBING**

A PRODUCT OF NATIONAL TUBE



**UNITED STATES STEEL**



1. MEAT TREATMENT: ACCORDANCE WITH SPEC MIL-S-2325. SHAFT SHALL BE MEAT TREATED TO AN ELASTIC LIMIT OF AT LEAST 100,000 PSI & A TENSILE STRENGTH OF AT LEAST 150,000 PSI. THE ELONGATION OF A TEST SAMPLE SHALL BE NOT LESS THAN 8 PERCENT IN 2 INCHES AFTER MEAT TREATMENT.

2. ROUNDT TOLERANCE NOT TO EXCEED .0003" ON .354" DIAMETERS. ROUNDT TOLERANCE ON 1/16" TAPER PER FOOT NOT TO EXCEED .0028" WHEN TESTED ON .354" DIAMETERS.

**For unmatched precision,**  
*Carpenter* **free-machining stainless**





*"Superb finish! You can tell it's MX!"*

*"Production increased 27%—finish excellent." "Costs reduced 24% with finish greatly improved." "Tool life increased 200%—superior finish."*

These are statements we get from shops reporting on results they have obtained with USS MX Free-Machining Steel. Invariably they have good things to say about the finish of parts made from USS MX Steel.

In other words, this fast-cutting screw stock does more than boost output, increase tool life and cut costs. It enables you to produce parts that have the clean, sharp finish that stamps them as a quality product and makes them easier to sell.

The better finish you get with USS MX Steel results from two important properties—superior machinability and consistent uniformity... uniformity in cutting characteristics, in composition, and in freedom from injurious imperfections.

These qualities of MX Steel, maintained in shipment after shipment, not only beneficially affect part finish, but help to keep rejects to a minimum due to the fact that they make it possible to produce parts of close dimensional accuracy throughout the run.

Why not give MX Steel a trial in your own shop? *It costs no more than*

*ordinary screw stock.*

Available in both Bessemer and Open Hearth grades, USS MX Free-Machining Steel is produced in all the popular screw stock sizes. It is sold in cold-finished form by your regular supplier, under either our trademark "MX" or his own identifying mark. "MX" Steel is available in hot-rolled form through any USS Sales Office.

UNITED STATES STEEL CORPORATION, PITTSBURGH  
AMERICAN STEEL & WIRE DIVISION, CLEVELAND  
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.  
UNITED STATES STEEL SUPPLY DIVISION  
WAREHOUSE DISTRIBUTORS, COAST-TO-COAST  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

**Better finish . . . fewer rejects . . . lower costs**



**— when you do the job with free-machining**

**MX**

Registered trademark

**UNITED STATES STEEL**

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—99



Look How You Can  
Save with  
**PREFORMED**

**CARMET**<sup>®</sup>

**DIE SECTIONS**

these Blanks are preformed  
to a Finishing Allowance  
of .018"-.022" per side



Write for Your Copy:  
**CARMET CATALOG**

Just out . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, punches, draw die inserts, etc.; also special preforming to order.

● Write for your copy.

ADDRESS DEPT. M-95

These tungsten carbide die sections are of Carmet CA-11, a special grade developed expressly for punches, dies, and other heavy shock applications where wear and abrasion resistance are required.

These blanks have a span of 1.315" with a wall thickness of only .046", but they were easily produced to close tolerances by AL's precision preform methods. All surfaces are clean, smooth and free from defects, requiring only a minimum amount of grinding to final dimensions.

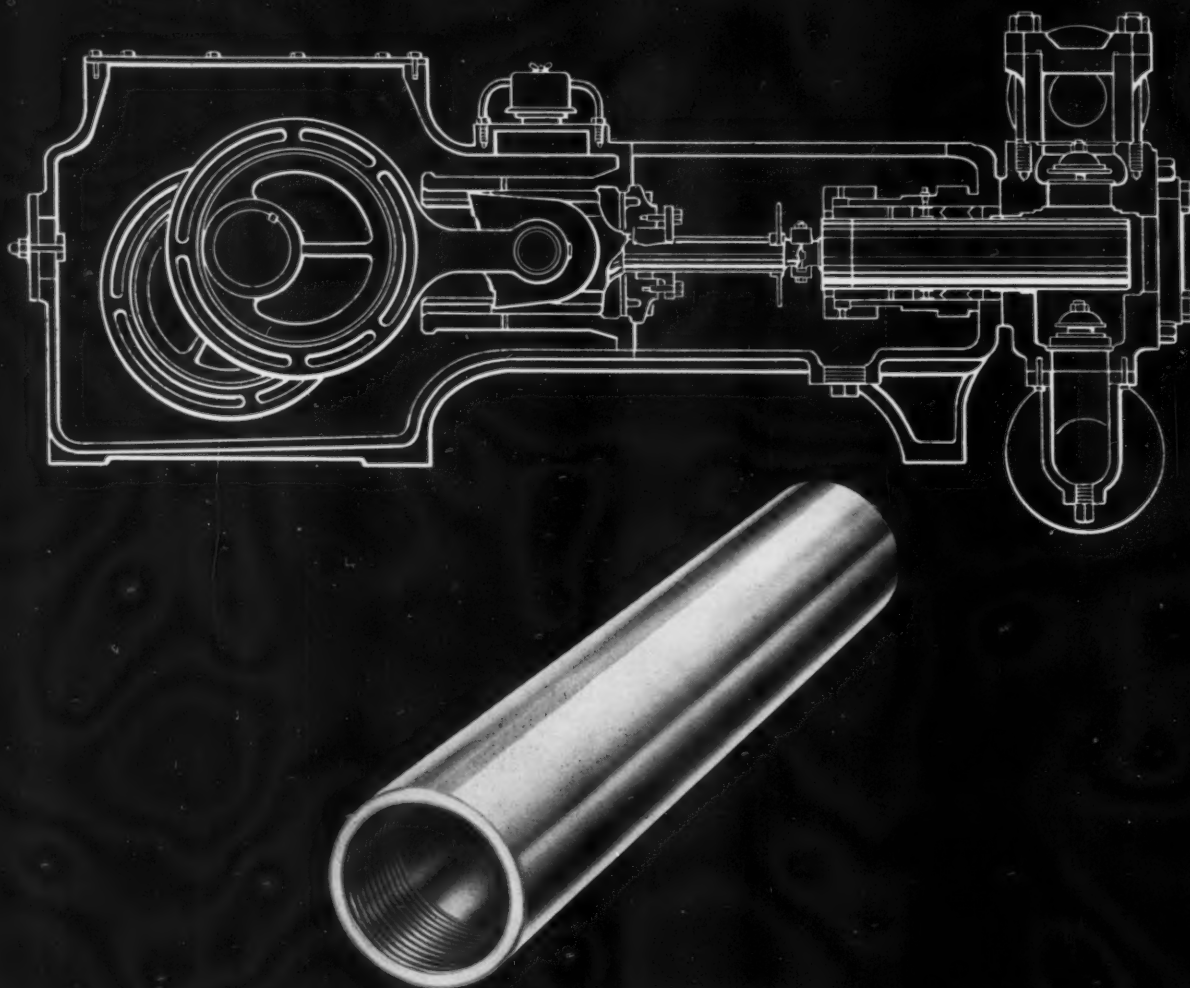
Carmet carbides can be accurately produced to practically any shape or size your designs may require, and can be supplied preformed as desired. Typical highly successful applications include inserts for drawing, heading, extruding and blanking dies; gauge and wear parts; pins; bushings; etc.

Find out, TODAY, how you can cut costs with preformed Carmet. Write or call Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Mich.

For nearest representative, consult Yellow Section of your telephone book.

For ALL your CARBIDE needs, call  
**Allegheny Ludlum**  
WSW-6636





## Reducing Costs With Job Matched Tubing

Does a higher grade tube really cost more? Reduced overall manufacturing cost of pump plungers resulted when one maker switched from tubing made from open hearth processed alloy steel to B&W electric-furnace Alloy Steel Tubing. Rejections on a large production run were reduced drastically (10.75% to 1.25%).

The plunger had to have a very good finish and was to be chrome plated. Jobs like this require high quality and "clean" steel. Because of B&W's melting practices and familiarity with making "clean" steels for bearings and other applications, it was suggested to the fabricator that he consider B&W electric-furnace 8620 Steel Tubing. The use of B&W electric-furnace Alloy Steel drastically reduced rejects on the finished part.

Once again Mr. Tubes proved conclusively that final cost—not initial cost—is the measure of good tube fabricating practice. If you're concerned with costs as well as producing a good finished product, get in touch with Mr. Tubes. He can help you save money. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-6100-M5

Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels.

Now...it's easy to remove even

**EPOXY  
FINISHES**

...with Oakite's **NEW**  
**STRIPPER S.A.**

Did you think epoxy finishes next to "impossible" to remove? It *was* a tough job. That was before Oakite developed Stripper S.A. Here's what it has been doing:

- 1 A 3/16" thick coating built up from layers of epoxy coating and wrappings of fiber glass was stripped from gun barrels by Stripper S.A. by overnight soak. Everything tried previously had failed.
- 2 Brass plated steel parts were stripped of their epoxy finish in a matter of minutes.
- 3 Workholding spindles and racks laden with at least 10 coats were bared to metal by a short soak. Paint hooks formerly burned clean are now soaked clean instead.

Oakite Stripper S.A. is safe for all metal surfaces except zinc and magnesium. This stripper needs no heat, has no flashpoint, rinses with water.

If you have an epoxy or other application that has defied stripping, you have a job for Oakite Stripper S.A. It's the latest in Oakite's broad line of paint strippers for every requirement. Write for details. Oakite Products, Inc., 26 Rector Street, New York 6, N. Y.



Export Division Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada



Now, all former hot rolled  
Crucible REX high speed rounds  
supplied with a new thrift finish

*for the price  
of this  
you get this*



Here's a revolutionary, new Crucible policy designed to provide an improved product—save time and processing costs. Now, Crucible furnishes all REX® high speed rounds from  $\frac{5}{8}$ " up with a machined surface, close to size and free from decarburization. All bars from  $\frac{1}{4}$ " to  $\frac{5}{8}$ " round are supplied cold finished.

This new *thrift* finish means important savings to you — whether you've been paying extra for decarburization and stock removal, or grinding or rough turning rounds in your own shop. Of course, where extremely close tolerances are demanded, precise centerless grinding is still available at a small extra.

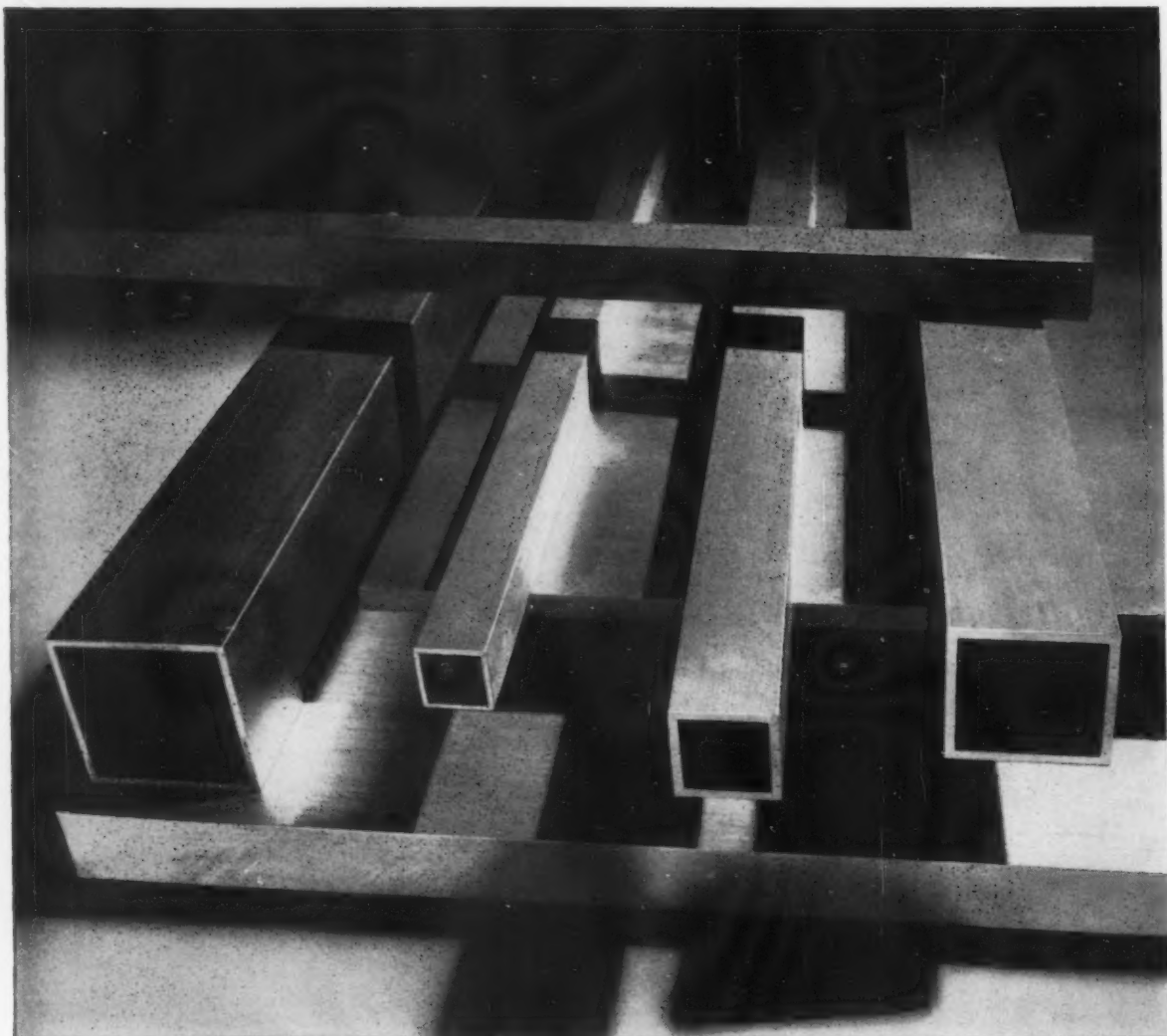
It's another Crucible "first" that offers you substantially more for your high speed steel dollar. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

**CRUCIBLE**

first name in special purpose steels

**Crucible Steel Company of America**

Canadian Distributor — Railway & Power Engineering Corp., Ltd.



## Try this new square magnesium tubing

*Now—from your Dow magnesium distributor—square extruded tubing  
for easier construction of jigs, fixtures, platforms and dollies*

Square magnesium tubing combines light weight with strength, rigidity and dimensional stability. Used with magnesium tooling plate, it permits simplicity of design and construction of assembly jigs, testing fixtures and stands, movable platforms, dollies and many other tooling applications.

The square shape offers large areas of contact between members for added strength, provides flat work surfaces.

It's easier to weld, easier to cut and fit, easier to assemble—will save you time and effort in both construction and in use.

Square extruded magnesium tubing, as well as magnesium tooling plate, is available from stock through the Dow magnesium distributors listed below. Contact the one nearest you next time you have an application for a light, strong, easy-to-fabricate tooling material. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 1420Y.

**AVAILABLE FROM STOCK AT:** Copper and Brass Sales, Inc., Detroit, Michigan • Fullerton Steel and Wire Co., Chicago, Ill.,  
Hubbell Metals Inc., St. Louis, Mo. • A. R. Purdy Co., Inc., Lyndhurst, N. J. • Reliance Magnesium Co., Los Angeles, Calif.

YOU CAN DEPEND ON

**DOW**

HAYNES Alloys solve the *tough* wear problems

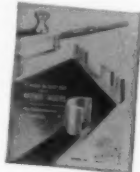


## HANDLES 130 TONS of hot abrasive mixture without appreciable wear

A custom-tailored "Nose" made of HAYNES STELLITE alloy increased the service life of an extrusion torpedo by more than 10 times. The torpedo heats an abrasive mixture of thermoplastic resins containing finely ground limestone and red slate to about 400 deg. F as it is extruded under an 8000-psi pressure. The hot, abrasive material flows over the nose of the torpedo at the rate of 1.5 in. per second.

At one time an alloy steel torpedo, heat-treated to Rockwell C-35, was used in this application. It suffered extreme wear after handling only 13 tons of the mixture. A tool steel nose gave no better service. The nose made of HAYNES STELLITE alloy showed no wear after processing 45 tons of material, and is still in use after processing over 130 tons.

There are over 20 HAYNES alloys specifically designed to resist heat, corrosion, abrasion, or erosion, that can be shaped to your specifications and furnished ready to use. For literature, write to HAYNES STELLITE COMPANY, Division of Union Carbide Corporation, Kokomo, Indiana. For on-the-job assistance, contact one of our district offices located in Chicago, Cleveland, Detroit, Houston, Los Angeles, New York and San Francisco.



The original torpedo, constructed of conventional materials, is well-worn after handling only 13 tons of the abrasive mixture.

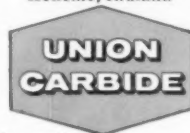


Ten times the life and still no sign of wear is the record made by the HAYNES STELLITE alloy No. 3 part, shown above.

# HAYNES ALLOYS

HAYNES STELLITE COMPANY

Division of Union Carbide Corporation  
Kokomo, Indiana



The terms "Haynes," "Haynes Stellite" and "Union Carbide" are registered trademarks of Union Carbide Corporation.

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—105

# NB FACTS

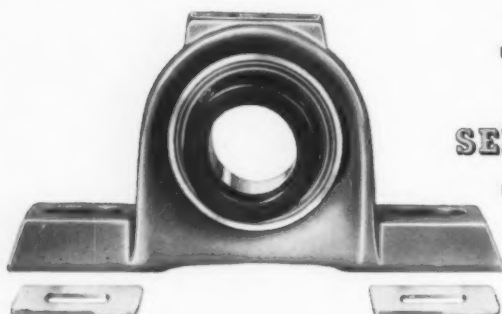
## NEW DEPARTURE PILLOW BLOCKS— BUILT FOR LOWEST MAINTENANCE

- New Departure adapter ball bearings are sealed and lubricated for life.
- Design is compact and rigid—fits easily in limited space.
- No grease nipples or other protruding lubricating fixtures needed.
- Pillow blocks are easily mounted without need for any special tools.
- New Departure ball bearings are high capacity, precision-built for long life.
- Bearing and block surfaces are spherical to accommodate any misalignment.
- Thirty-two shaft sizes,  $\frac{1}{2}$ " through  $2\frac{15}{16}$ ", for wide variety of applications.
- Interchangeable with most other makes of pillow blocks.

Mounting pads are furnished with each New Departure Pillow Block to assure easy interchangeability with all pillow blocks having a high base-to-center dimension.

Bearings are easily applied to shafting and are positively locked in position with eccentric cam locking collar and set screw.

Elongated bolt holes designed to accommodate practically every type of spacing for hold-down bolts.



EQUIPPED WITH



BALL BEARINGS

New Departure Pillow Blocks employ performance-proved Type AE adapter ball bearing with Senti-Seals for long-life protection against dirt or grease leakage.

**Send for Catalog PBC**



**NB**  
**NEW DEPARTURE**

DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BALL





## **IT HAS A JOB in one of the world's most spectacular machines**

This forged-steel cylinder, one of four supplied by Bethlehem, was built for use in a king-size hydraulic jacking system. Sound rather prosaic? It isn't. The jacking devices are part of the leveling equipment in one of the world's most spectacular machines—the Marion 5760.

The 5760 is an electric power shovel so huge as to defy description. In working position the top of the boom is as high above ground as the roof of a 12-story building. Dipper capacity is 70 cu yd.

The cylinder forgings that Bethlehem furnished weigh  $11\frac{1}{2}$  tons each. They are 10 ft  $3\frac{1}{2}$  in. long. They have a maximum OD of 48 in. and a body OD of 45 in. In each case the diameter of the main bore is  $35\frac{1}{4}$  in. These are big cylinders, rugged and

strong—as they would have to be in a shovel of such giant proportions.

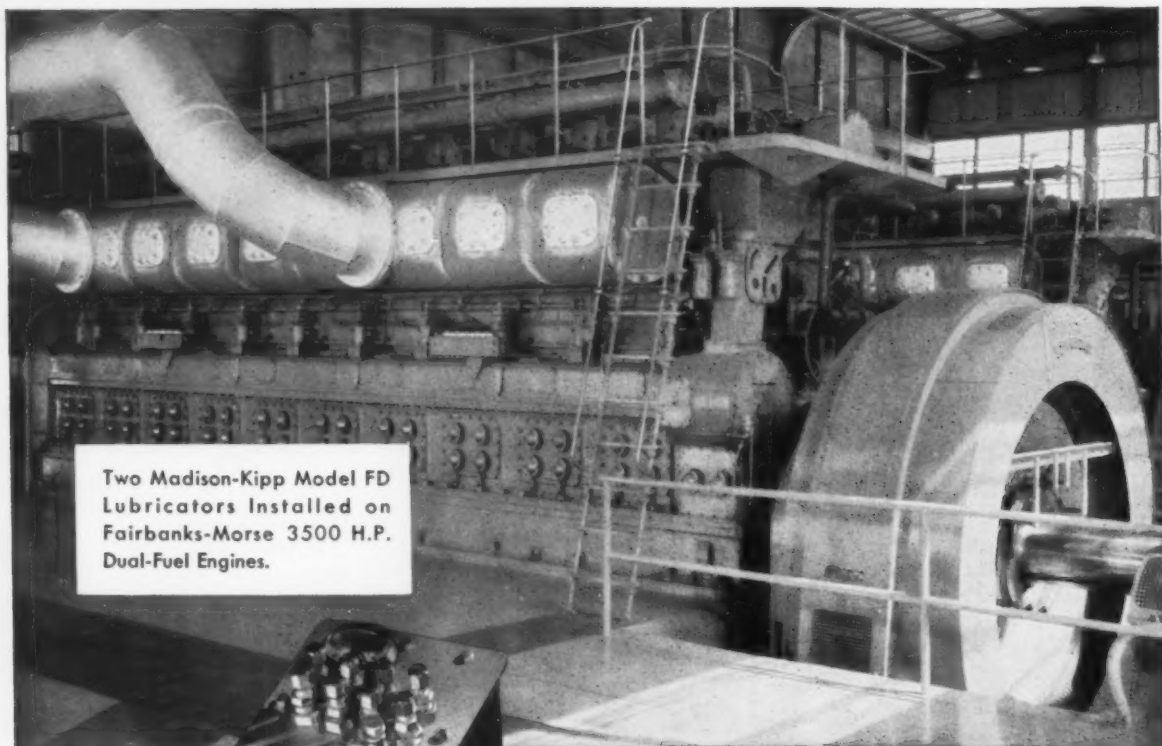
You yourself may never need forgings of this general nature. Perhaps your requirements run to smaller items, or something much larger. But no matter what the design, Bethlehem is always able to meet your specifications. Bethlehem's integrated set-up can produce all types of press, hammer, and closed-die forgings, and machine them as desired. When you are next in the market, we suggest you check fully with our engineers.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation. Export  
Distributor: Bethlehem Steel Export Corporation

# **BETHLEHEM STEEL**





Two Madison-Kipp Model FD Lubricators Installed on Fairbanks-Morse 3500 H.P. Dual-Fuel Engines.



**Machines of great performance  
use the most dependable  
oiling system ever developed**

**MADISON-KIPP**

*Fresh Oil*

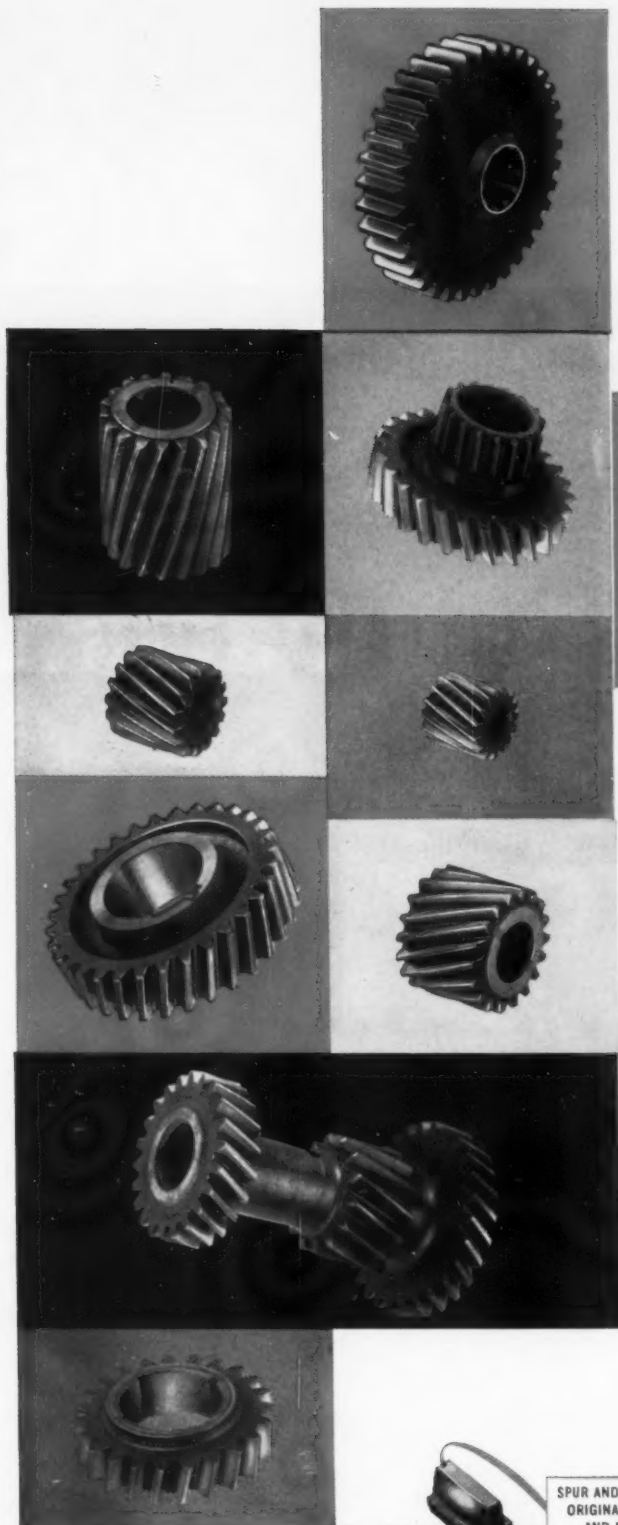
...by the measured drop, from a Madison-Kipp Lubricator is the most dependable method of lubrication ever developed. It is applied as original equipment on America's finest machine tools, work engines and compressors. You will definitely increase your production potential for years to come by specifying Madison-Kipp on all new machines you buy, where oil under pressure fed drop by drop can be installed. There are 6 models to meet almost every installation requirement.



**kipp**

**MADISON-KIPP CORPORATION**  
203 WAUBESA STREET • MADISON 10, WIS., U.S.A.

Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools



## GEAR TOOTH NICKS and "HICKIES"

**HONING IS THE  
LOW-COST WAY OF  
SILENCING THEM**

You can hone the average automotive transmission gear in from 15 to 60 seconds. This single operation gets rid of all the noisy nicks and hickies that are so troublesome and tedious to deal with in any other way.

But that's not all. Red Ring honing also improves over-all surface finish—down to 2-4 microinches if necessary.

The initial pass under the honing tool is an effective inspection procedure in that it immediately reveals any distortions that may exist in tooth profile, spacing and pitch diameter runout. When such distortions are not excessive, honing corrects them.

If you want to reduce the cost of silencing noisy gears (1" to 12" PD), write for Bulletin H 57-2.

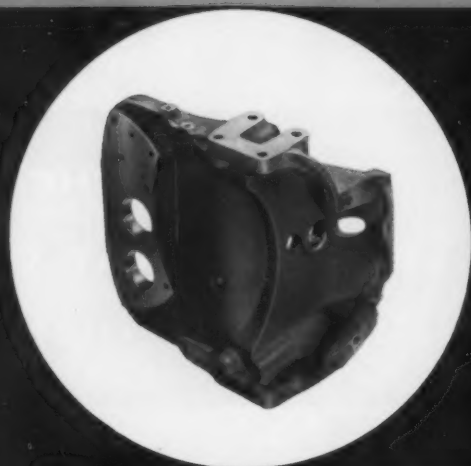
SPUR AND HELICAL GEAR SPECIALISTS  
ORIGINATORS OF ROTARY SHAVING  
AND ELLIPTOID TOOTH FORM

7810

**NATIONAL BROACH & MACHINE CO.**

5600 ST. JEAN • DETROIT 13, MICHIGAN

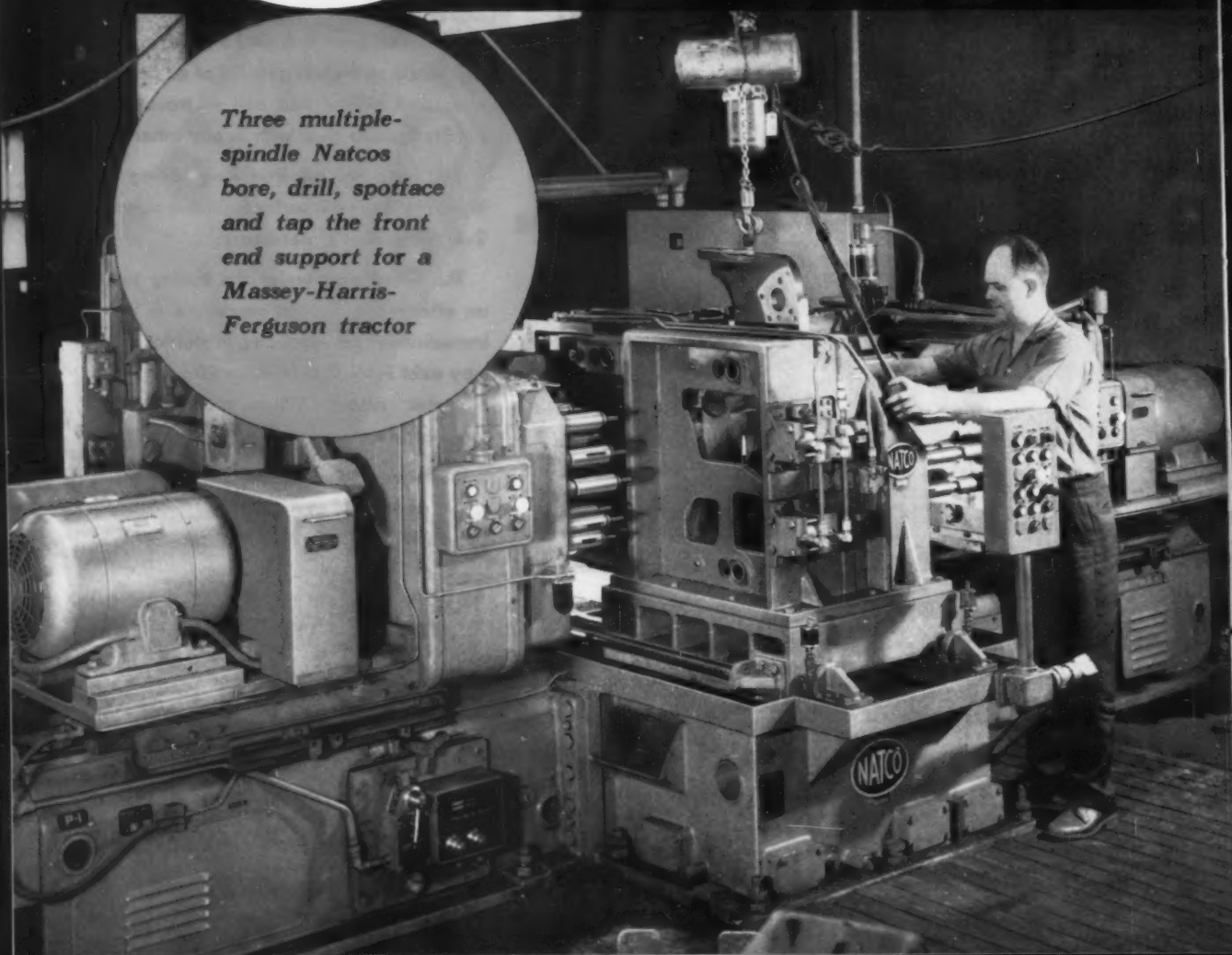
WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



*At Massey-Harris-Ferguson*

# Natcos Save 100 Parts...

*Three multiple-  
spindle Natcos  
bore, drill, spotface  
and tap the front  
end support for a  
Massey-Harris-  
Ferguson tractor*







# 60 Man Hours Every

## *on Rugged Axle Support Castings*

Massey-Harris-Ferguson checked it two ways. Nine general-purpose machines would do the job—or 3 Natcos. They chose the Natcos for these reasons:

- *Saving of \$30,000 in machine cost*
- *Saving of 60 man hours every 100 parts*
- *Saving of 65% in floor space*

The Natcos handle all drilling, boring, spotfacing and tapping—a total of 67 operations on the 182-pound front axle casting. The casting is heavy, irregular—tough to fixture and clamp. The Natcos meet production requirement of 11 parts per hour.

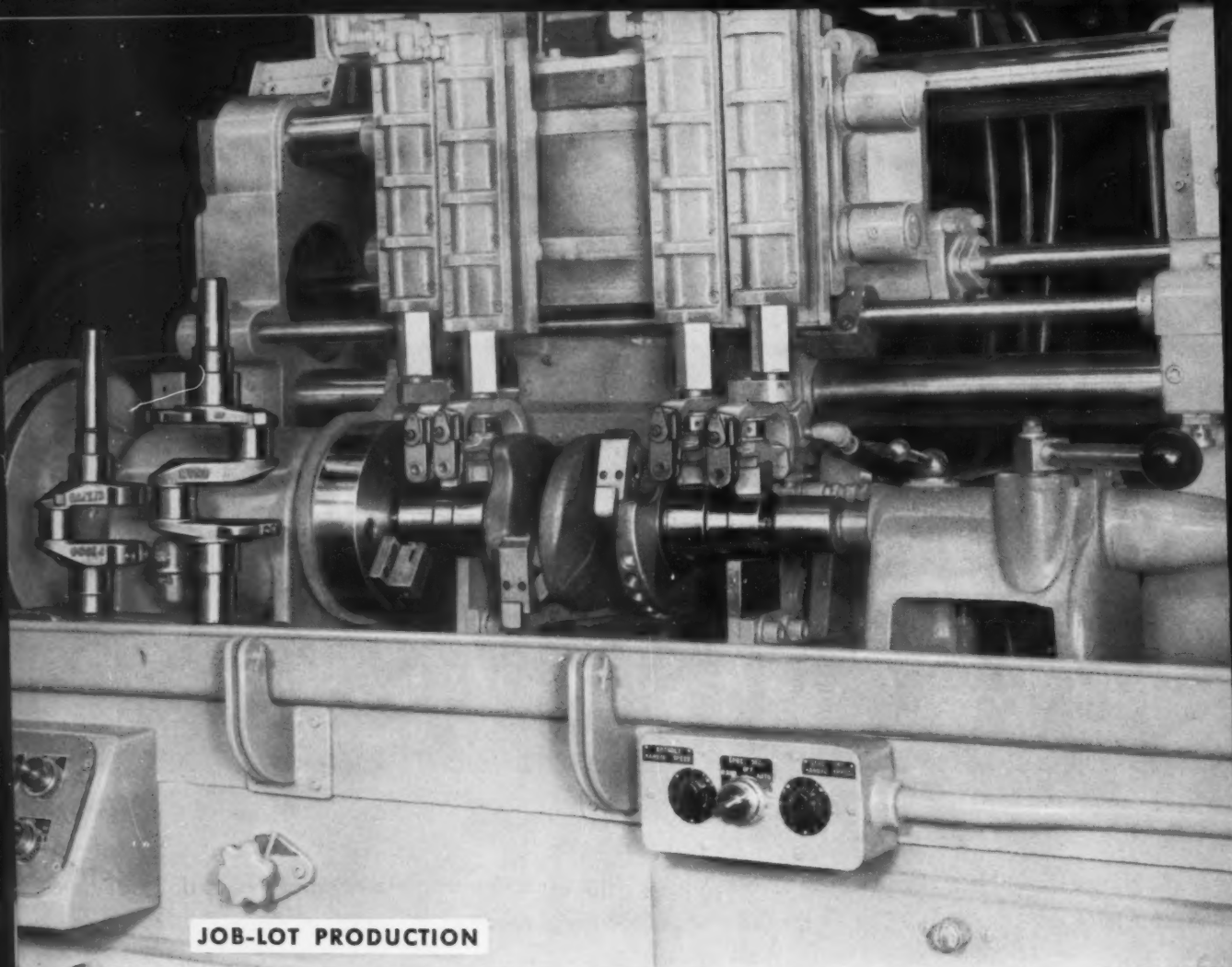
Natco provided complete tooling which features automatic clamping, cycling and chip blow-out. All three machines are of unitized construction, giving Massey-Harris-Ferguson the flexibility to run different parts of redesigns of the same part.

Let Natco Field Engineers point out cost-saving and time-saving methods on your next drilling, boring, facing or tapping job. Natco offices are located in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.

## **National Automatic Tool Company, Inc.**

*Richmond, Indiana*

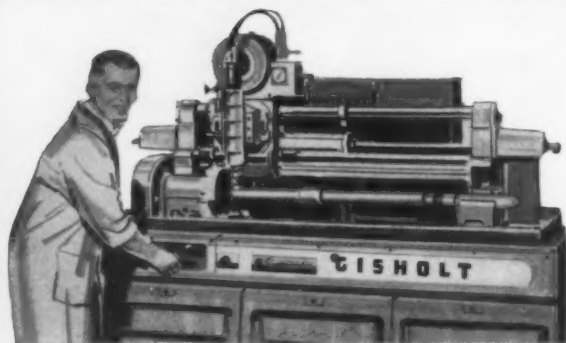
*Multiple-spindle drilling, boring, facing and tapping machines. Special way-type, index and transfer machines.*



#### No. 51A General Purpose Superfinisher

**CRANKSHAFTS** in small job-lots are Superfinished with this setup—holding the piece between centers and driving from a keyway with a faceplate driver. Latch-on follower-type arms Superfinish the crank pins, while the main bearing and oil seal surfaces are Superfinished by standard overhead quills. Main and pin bearings are taken from a ground surface of 30 micro-inches down to 8 or less. Oil seal surfaces on shaft ends are Superfinished to 4 or less. Production: 44 to 53 pieces per hour at 80% efficiency.

## NEED SMOOTHER SURFACES AT LOW COST? See the



**BEEN LOOKING FOR AN INEXPENSIVE PROCESS** to improve product quality—to help market your product easier against increasing competition?

Gisholt Superfinishing may well be your answer ...it has been for some time for a long list of leading manufacturers.

With this modern process, you'll definitely reduce—or even eliminate—the cost and time of grinding, polishing or buffing operations. With the exclusive Gisholt Superfinishing method, you utilize a "scrubbing" effect through an abrasive stone which oscillates as the work rotates. Chatter marks, grind-



**ATTACHMENTS**

#### No. 4 Superfinisher Attachment

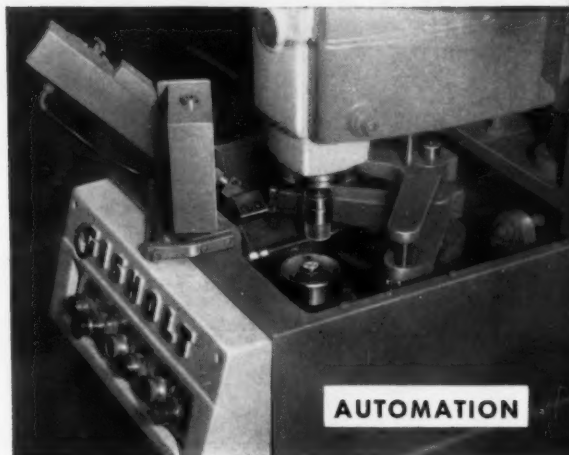
**AXLE JOURNALS** for railroad switchers are Superfinished with No. 4 Attachment on Gisholt Saddle Type Turret Lathe in this operation. In three steps, lathe finish of 200-250 micro-inches RMS is reduced to final surface finish of 8-10 RMS, removing .004" to .005" stock to eliminate tool marks. Through Superfinishing, 25 switchers logged 30,000 trouble-free hours on journals in first few months.



Superfinished tappet with .005-inch crowned top.

#### No. 81 High Production Superfinisher

**CAST IRON VALVE TAPPETS** are Superfinished in long runs on this job, featuring fully automatic handling with a work transfer device. Cup-shaped stones are used, Superfinishing from flat ground surface down to 5 micro-inches RMS or less—and rotating off center to generate .005" crown on the cam end of each tappet. In only 16 seconds floor-to-floor time per piece, the valve tappets are economically Superfinished for longer wear life and better product quality.



**AUTOMATION**

## NEW GISHOLT MASTERLINE SUPERFINISHERS

ing flats, and amorphous "smear" metal left by grinding are completely removed. The true base metal is exposed—providing longer wear and better performance from your product.

Better still, most Superfinishing jobs are done in a fast, automatic cycle—producing very low micro-inch surface readings in the shortest possible time.

The jobs shown here are typical examples where Superfinishing solved production problems and improved product quality. Ask your Gisholt Representative to tell you about them—and many more—in full detail. Call him today!

**WRITE TODAY** for 30-page illustrated booklet "Superfinishers," explaining Gisholt Superfinishing process in interesting detail.



# GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

# Magnamatics





# reduce cabinet breakage 70% at Motorola

**The Problem:** Motorola's assembly line in Quincy, Illinois experienced difficulty fastening chassis and fibre backing to plastic radio cabinets. Time was lost repairing cabinets broken by over-tightened screws . . . profits were reduced by discarded cabinets.

**The Solution:** Thirteen CP "Magnamatic" One Shot Air Screwdrivers replaced previous tools that did not provide sufficient quality control.

**The Result:** CP "Magnamatics" have been on the job for over eighteen months. Rejects have dropped 70 to 80 percent. The CP "Magnamatic" One-Shot clutch—runs nuts or screws to precise, pre-set torque—prevents over-tightening, makes it almost impossible to crack plastic cabinets or strip screw threads—doesn't ratchet, eliminates surface damage to lustrous plastic finishes. And more! Bonus benefits of "Magnamatics" include: a new low in maintenance costs (averages only 11¢ per tool per month), quiet operation and no cost or time lost due to bit breakage.

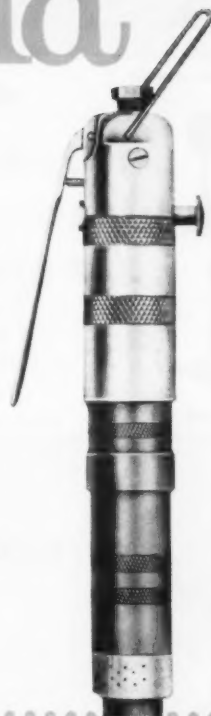
**Capacities: #4 screws to 3/8" bolts. Reversible and non-reversible types.**



## Chicago Pneumatic

8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES  
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



Chicago Pneumatic Tool Company, Dept. M-78  
8 East 44th Street, New York 17, N. Y.  
☐ Please arrange demonstration. No obligation, of course!  
☐ Please send me FREE booklet SP-3165 "Magnamatic Case Histories"  
☐ Please send me FREE Bulletin 580 on "Magnamatic" units for multiple applications.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



Duplex Surface Broaching Machine  
5, 10, 15 and 25 Ton capacity



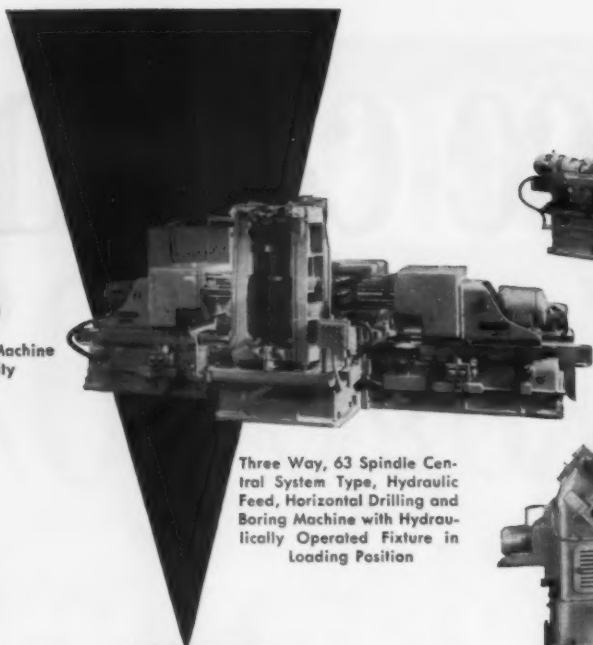
Single Slide Broaching Machine  
5, 10, 15 and 25 Ton capacity



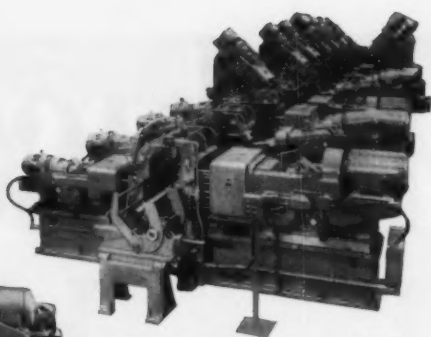
1, 2, 3, 4 and 6 Spindle  
Sensitive Drilling Machines



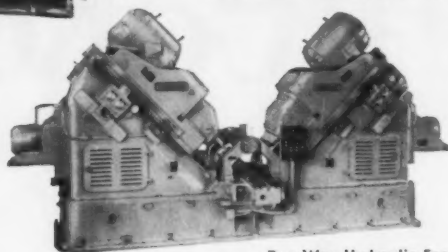
Extremely accurate  
Hammond Tool  
Room Grinder



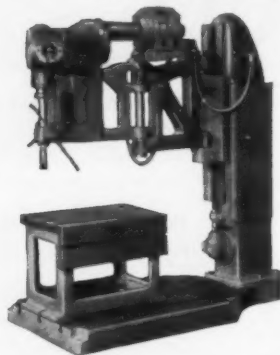
Three Way, 63 Spindle Central System Type, Hydraulic Feed, Horizontal Drilling and Boring Machine with Hydraulically Operated Fixture in Loading Position



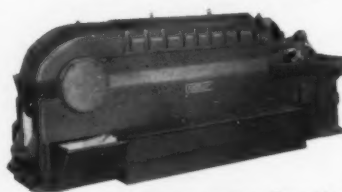
Station Type Machine Having 27 Stations,  
139 Spindles for Processing a V Type  
Automobile Motor Cylinder Block



Two-Way Hydraulic Feed  
Vee Type Stub Boring Machine



Unique Bracket Type Hammond  
Radial Drilling and Tapping Machine



Continuous Type Broaching  
Machine Built in Five Sizes

# FOOTBURT

## line of production machines

Way Type Drilling, Boring, Reaming, Tapping and Milling Machines with One, Two or More Ways . . . Station Type Machines . . . Center Column Type Machines . . . Cylinder Boring Machines . . . Inverted Drilling Machines . . . Surface Broaching Machines . . . Sensitive Drilling Machines . . . Hammond Radial Drilling Machines . . . Hammond Surface Grinding Machines . . . Manufacturing Type High Duty Drilling Machines . . . Independent Feed Drilling Machines . . . Special Machines.

**THE FOOTE-BURT COMPANY, Cleveland 8, Ohio**

Detroit Office: 24632 Northwestern Hwy., Detroit 35, Mich.

**ENGINEERED  
FOR  
PRODUCTION**

Write for Catalog

# FOOTBURT

## MACHINE TOOLS





**sets precedent by**

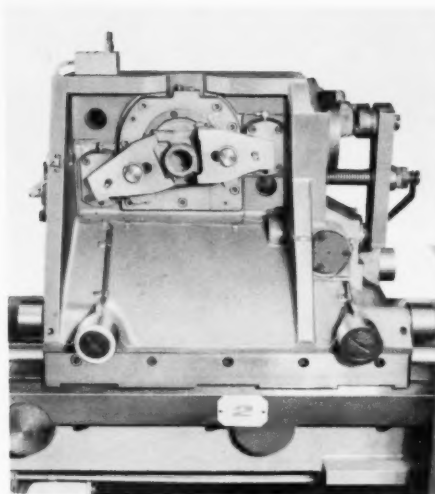
*complete automatic  
lubrication of fixtures...*

*processing one part  
each 20 seconds!*

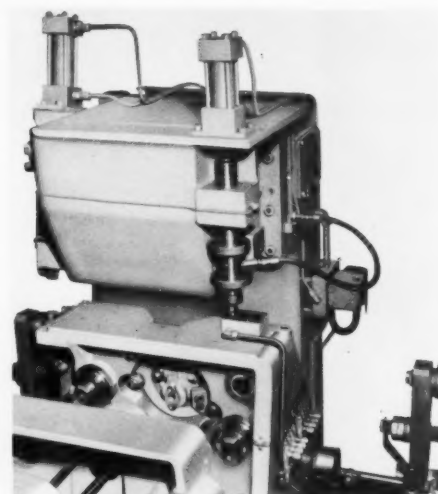




## PACE-SETTING FEATURES



*complete automatic  
fixture-lubrication*



*pressure-lubrication  
with each machine-cycle*

## STANDARD FEATURES

- special Buhr sectional-base construction to facilitate future part changes
- standard and special parts interchangeable for ease of maintenance
- hardened and ground steel ways
- J.I.C. Standards throughout
- individual push-button stations on feed-units
- central-mist lubrication on spindle heads
- lube-fault warning system
- positive pallet-clamping
- spindles arranged for pre-setting of cutting tools
- automatic probe-and-blowout
- automatic fixture-cleaning system

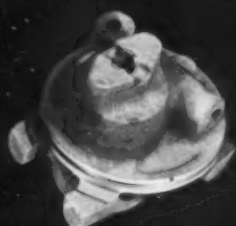
**BUHR** MACHINE TOOL CO.<sup>®</sup>

ANN ARBOR, MICHIGAN

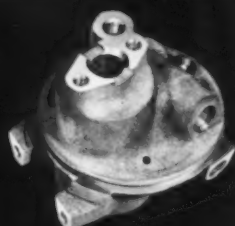
Solidly Engineered • Precision Built • for World's Leading Manufacturers



**36**  
operations on  
these parts...



**ROUGH**



**FINISH**



**ROUGH**



**FINISH**

on  
this  
machine...



sets pre  
machini  
pump h

**BUHR**  
CONOMATIC

precedent in  
ning hydraulic  
 housings...



# The ACKNOWLEDGED AUTHORITY of the METALWORKING INDUSTRIES

**F**or forty years . . . through fourteen editions . . . with over a million copies sold, MACHINERY'S HANDBOOK has been the indispensable reference book for designers and builders of mechanical products. Now the 15th Edition, with over 400 pages revised and brought up to date, gives you the latest and most authoritative information on present-day designing, manufacturing and metalworking practices.

## Practical Information for Every Shop Man

A modern handbook is a necessity for every man who holds or hopes to hold a responsible job in the mechanical industries. Shop men, as well as engineers and designers, find MACHINERY'S HANDBOOK invaluable. It contains the kind of information that is needed wherever machines, tools, and mechanical devices are designed or constructed.

MACHINERY'S HANDBOOK contains 1911 pages of mathematical and mechanical tables, rules, formulas and general data (see complete table of contents on page 3). Its "math" and other tables never subject to change are accurate to the last decimal point, because Handbook users all over the world have been checking them for 40 years.

## How Far Back Are You in the Handbook Parade?

Does your present Handbook give you *today's* answers? The 12th Edition of MACHINERY'S HANDBOOK was published in 1943—only 12 years ago—but . . . 474 pages were revised and 96 pages were added to provide new material for the 13th Edition in 1946. Then . . . 290 pages were revised to provide new material for the 14th Edition in 1949. And now . . . 432 pages have been revised to make the New 15th Edition better than ever and ready to help you tackle the problems of today.

MACHINERY'S HANDBOOK meets this need whether you are a designer, a machinist, a mechanical engineer, a student, a production executive, an apprentice, or an inspector.

Write for your copy of MACHINERY'S HANDBOOK today. If you send payment with your order, we pay postage and handling charges. Your money will be refunded if you decide not to keep the Handbook. Or, if you wish, we will send it to you under our Five-Day Free Examination Plan; you pay only after you have seen and used the Handbook, and discovered how much it can help you in your work.

**ORDER YOUR COPY TODAY! \$9.00**

In Canada or overseas, \$10.00

**THE INDUSTRIAL PRESS**  
93 Worth Street, New York 13, N. Y.





# You get automatic foolproof lubrication with **LUBRIVAL** circulating oil system

FARVAL—  
Studies in  
Centralized  
Lubrication  
No. 207

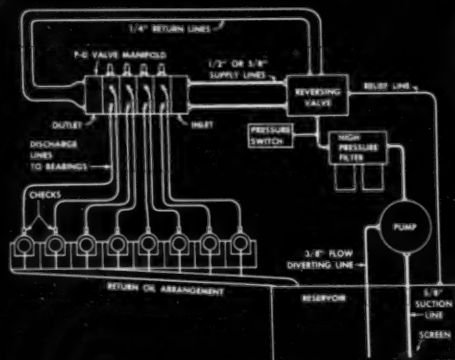
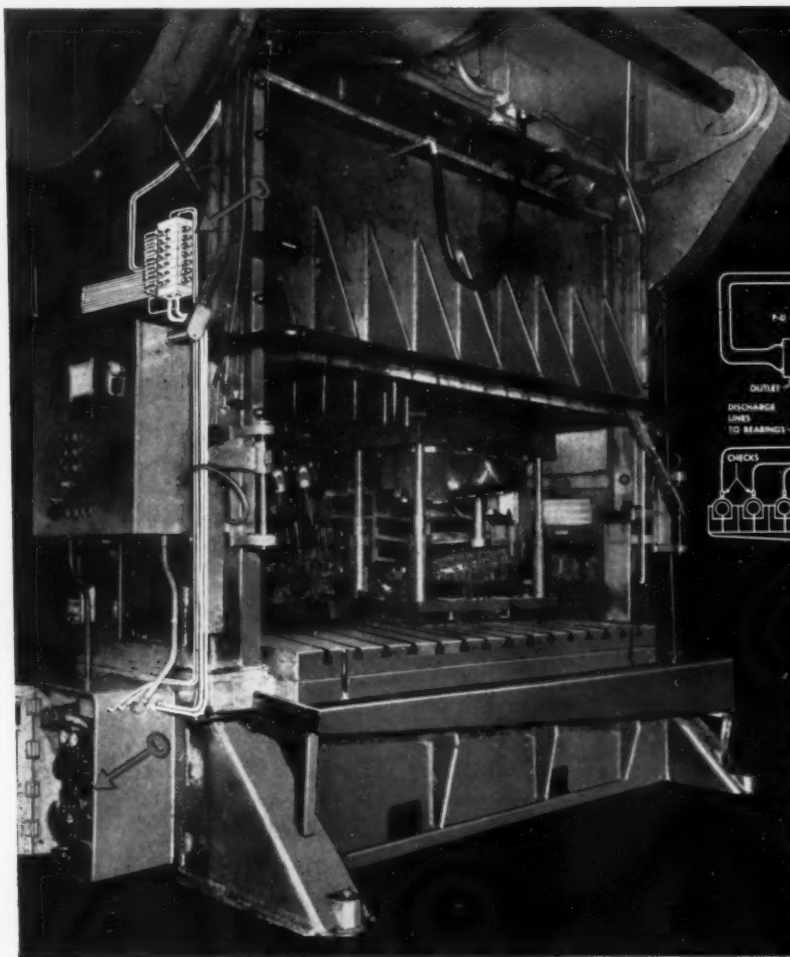


Diagram above shows components of a typical LUBRIVAL system—a manifolded group of four Progressive Dualine measuring valves at top, with lines discharging to eight bearings below. Other components indicated are variable delivery pump, high pressure dual filter, high-low pressure switch, reversing valve and oil supply lines. Return oil lines and reservoir indicated are to be supplied by equipment builder or user.

On press shown at left may be seen a manifolded group of seven LUBRIVAL valves, with other system components in a cabinet below. Oil reservoir is located inside press base.

● The bearings of this 150-ton metal stamping press and others of its type are now protected by LUBRIVAL. This new Farval system for circulating oil is being installed on many varied kinds of machine tools, presses, automated machines, and other equipment calling for circulating oil lubrication.

Employing the famous Dualine principle, LUBRIVAL delivers oil to manifolded measuring valves which feed it under pressure to the bearings. Lubricant is force-fed by positive piston displacement. Flow can be regulated over a range of 10 ounces to one gallon per minute. Valves have individual sight indicators and offer a degree of installation and operational flexibility previously unknown in such devices.

The Farval representative near you will give you all details. Or write for Bulletin 70. The Farval Corporation, 3276 East 80th Street, Cleveland 4, Ohio.

*Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing.  
In Canada: Peacock Brothers Limited.*

## KEYS TO ADEQUATE LUBRICATION—

Wherever you see the familiar Dualine valve manifolds, dual lubricant lines and central pumping station, you know a machine is being properly lubricated. Farval manually operated and automatic systems protect millions of bearings.



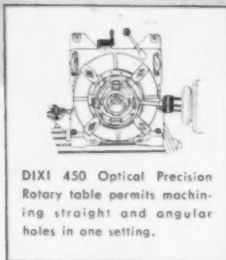
# DIXI 60 *horizontal optical jig borer*

**The ONLY Horizontal Jig Borer  
Built Today! Combines the  
ACCURACY of the Vertical Spindle  
With the VERSATILITY of the  
Horizontal Spindle**

**ACCURATE:** Optical settings provide an overall accuracy of .0002.

**VERSATILE:** Optical settings for operations in all planes and compound angles . . . equally suitable for tooling, short-run or production work . . . permits JIGLESS boring, facing, milling and drilling.

**PRODUCTIVE:** Saves time, labor & costs . . . Unclamping, positioning, fine adjustment, reclamping and rechecking can be made in less than 10 seconds.



5 OPTICAL MICROSCOPES

The DIXI Optical Reversing Process assures perfect alignment as well as round, taper-free holes. In work pieces with line bores on opposite sides, this is obtained by optically indexing the built-in rotary table 180°, locking the spindle feed and using the hydraulic table in-feed instead. Electrical infinitely variable speed spindle drive; infinitely variable hydraulic feeds; special features eliminate effect of spindle over hang on accuracy.

Made in Switzerland

All measurements in inches

- Guaranteed service by factory trained staff
- Engineering staff available for consultation
- Spare Parts in New York stock
- Your operators trained

DIXI 60 now in wide use in leading aircraft and manufacturing plants throughout the United States.

THIS VERSATILE MACHINE IN OPERATION at our New York, and other conveniently located Demonstration Centers.

Our Headquarters  
in New York City



## M.B.I. export & import Ltd.

A Division of Machinery Builders, Inc.

475 Grand Concourse, Bronx 51, New York

"Over 25 years experience in designing & building machinery"



Spur gear



Index plate



Retaining ring

## How one machine hardens them all *without distortion*

You can quench any part quickly from a hot, plastic state without warpage or distortion when you work with Gleason Quenching Presses.

Since no straightening operation is necessary after hardening you save time and

make a definite advance in quality control. Experience shows there is much less residual stress in non-straightened parts.

A button is pressed and the automatic quenching cycle is started. The lower die is swung back into the quenching position and the upper die descends rapidly, aligning the part while it is still in the plastic state.

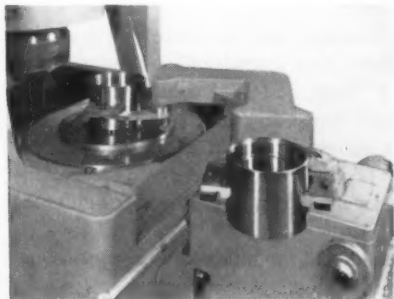
Carefully controlled metallurgically correct oil circulation cools and hardens the part uniformly to preset rates.

The two dies align the part throughout cooling, allowing the part its normal contraction but keeping it true. After the quench, the part is swung out for removal.

As shown in the photograph at the left, Gleason Quenching Presses can be arranged with a completely automatic load and unload unit.

You can harden *any* part, regardless of shape, with this method. There are three presses accommodating parts up to 36" diameter. Still another Gleason Press automatically hardens and straightens shafts and similar parts up to 4" in diameter and 40" long.

Write for literature on the presses. And for recommendations on the press and dies that best fit your products, send us blueprints.



The Gleason Nos. 16 and 26 Quenching Presses can be arranged with the load and unload unit. This unit makes it possible to speed production and reduce labor requirements.



# GLEASON WORKS

Builders of bevel gear machinery for over 90 years  
1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

## **You can expand your plant,**

### **for production men**

This Avey machine drills various patterns of holes in jet engine parts by changing program drums or by alternating two automatically-driven locators which position the table accurately from a radial position. Program drum also programs one or more of the four drilling units for drilling, reaming, and similar operations.

The machine consists entirely of standard Avey units: four Aveydraulic automatic units with 12" feed; cast iron columns; 120" fan type steel base; 60" Electrode table. Top column and unit have an in-and-out traverse of 20". The ways are mounted on steel adaptor blocks which can be removed for different heights.

All units and the index table are push button-controlled.

If you're looking for flexibility in a special machine, your Avey man's the man to see.



### **for management**

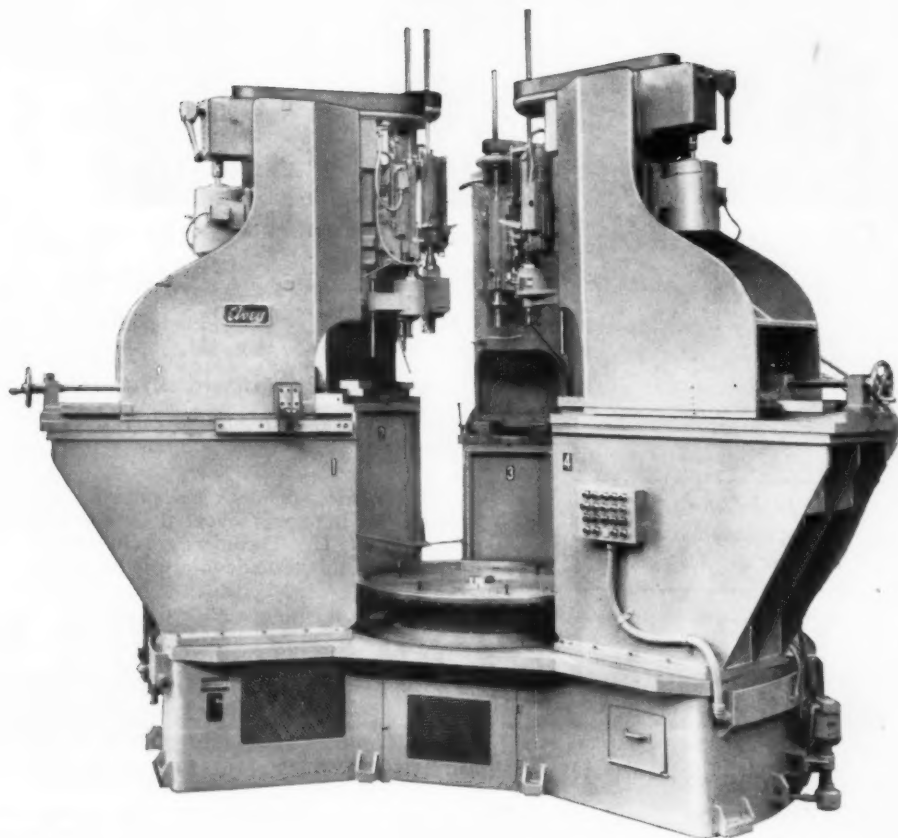
The pressure to expand is terrific on managements who want to be prepared for the rocketing market growth predicted for the next 10 years. They realize that they will probably lose ground by standing still, but they also want to protect their balance sheets, and their peace of mind, from heavy debt due to adding costly plant space.

Avey production machines offer a quick and economical means of achieving the primary objective of expansion: increased productive capacity. They concentrate many operations in a comparatively small area, and free both floor space and labor for other productive operations. Their production rate enables you to increase your sales volume; and their fast pay-off rate gives you substantial earnings on your investment in a short time. Their unitized construction permits economical re-engineering to handle new parts or design changes.

AVEY DIVISION, THE MOTT & MERRYWEATHER MACHINERY CO., BOX 625, CINCINNATI 1, OHIO

**drilling, tapping, production machines**

**and sleep well too**



**The *Newest***

# ACME Model HA THREADING MACHINE



ACME Model HA (heavy duty) Single Spindle Threading Machine 2" capacity.



**Design**



**Production  
Features**



**Built-in  
Precision**



**Versatility**

**Wide Speed Range:** The Acme Model HA has eight spindle speeds assuring correct speeds for various diameters and materials to be threaded.

**Adjustable Carriage:** Adjustable both horizontally and vertically to permit alignment with the die head.

**Hardened and Ground Ways:** Rectangular ways guide and support the carriage insuring precision alignment and smooth carriage travel.

Ask for bulletin HAT  
giving description and  
complete specifications.

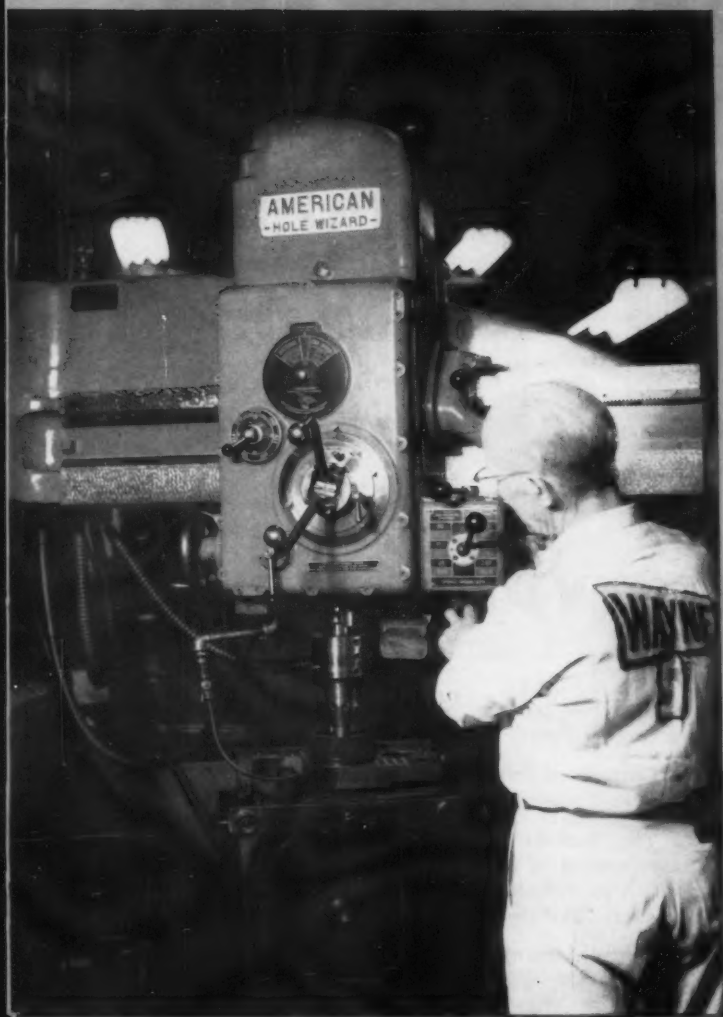
The Acme Model HA is adaptable to either tangential or hob type die heads using tangential or hob type chasers of standard design. Model HA Threaders are built in 1", 1½", 2" and 2½" capacities in single or double spindle design.

## THE HILL ACME COMPANY

ACME MACHINERY DIVISION • 1209 W. 65th St., Cleveland 2, Ohio  
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING & POLISHING MACHINES  
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

Costs Reduced  
Quality Improved



The many production advantages and cost reducing virtues of "AMERICAN" Hole Wizards are disclosed by bulletin No. 325.

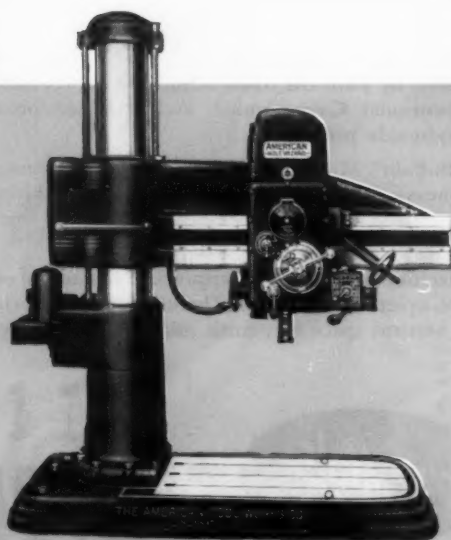


Wayne Manufacturing Company  
Pomona, California  
Newark, New Jersey

world's largest producer of  
**POWER SWEEPERS**  
for Cities and Industry

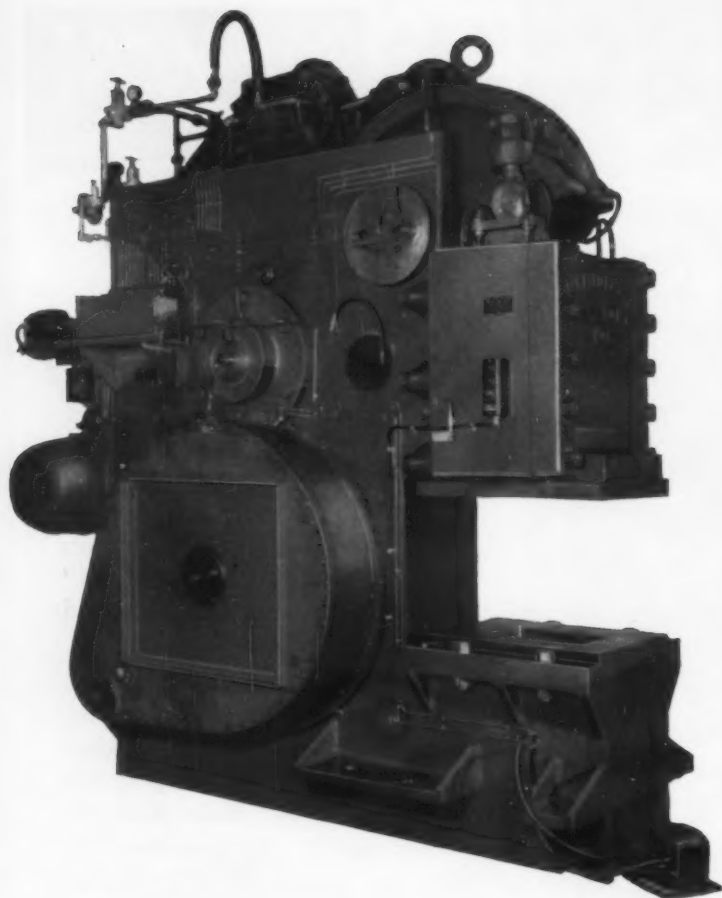
... cut drilling and boring costs over 50% with an "AMERICAN" Hole Wizard Radial and improved the quality of the work.

Using an assortment of well designed drilling, boring, reaming, tapping, spot-facing and chamfering tools in combination with the "AMERICAN" Hole Wizard's power, rigidity and predominant ease of operation, spectacular savings have been recorded over previous horizontal boring mill methods.



**THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.**

**LATHES AND RADIAL DRILLS**



**125 to  
1400  
TONS  
for  
Punching  
Shearing  
Blanking**

## **"BUFFALO" MILL TYPE SHEARS**

These rugged, dependable machines handle jobs not covered by standard lines, filling the gap between the conventional C-type punch and the four-column or straight-side press.

"Buffalo" Mill Type Shears are rigidly constructed for heavy-duty punching, shearing or blanking. The high-tensile, electrically-welded steel plate frame gives you great strength with compactness.

Machine operators will appreciate the ample tooling space, open on three sides. There is adequate horizontal and vertical space to permit relatively heavy type top

and bottom bolsters. Note the automatic air-operated tilting stripper.

Centralized lubrication system insures long, maintenance-free service. Twelve sizes from 125 to 1400 tons.

The "Buffalo" Mill Type Shear is another outstanding example of the "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life in every "Buffalo" product.

For full information, contact your nearest "Buffalo" Machine Tool Dealer, or write for Bulletin No. 3650.



**BUFFALO FORGE COMPANY**

440 Broadway, Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

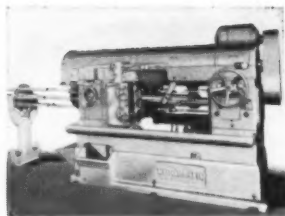
DRILLING      PUNCHING      SHEARING      BENDING



If you haven't read this important booklet, your production line may be operating at less than peak efficiency. Your operations may be beating competition with HSS today, but you will likely need carbide tooling to be the leader tomorrow.



Write for your free copy of this important booklet today!

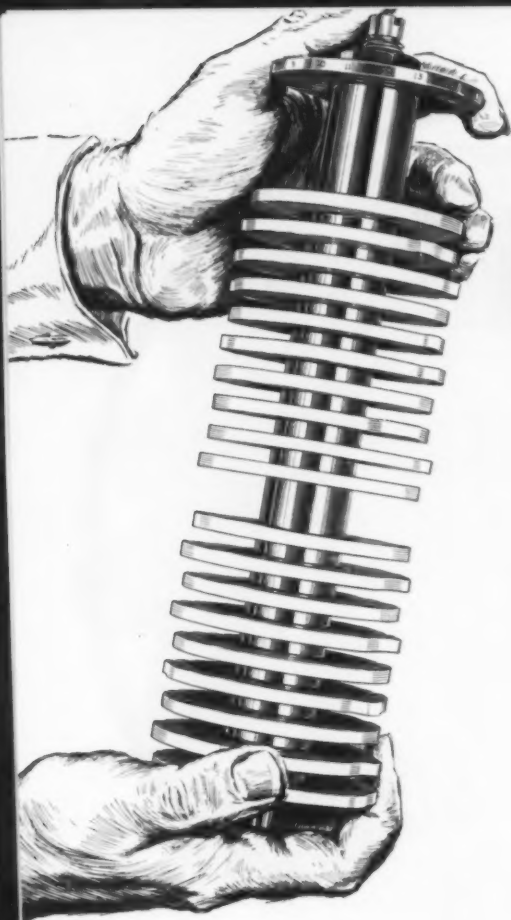


# Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.

For more information fill in page number on Inquiry Card, on page 221

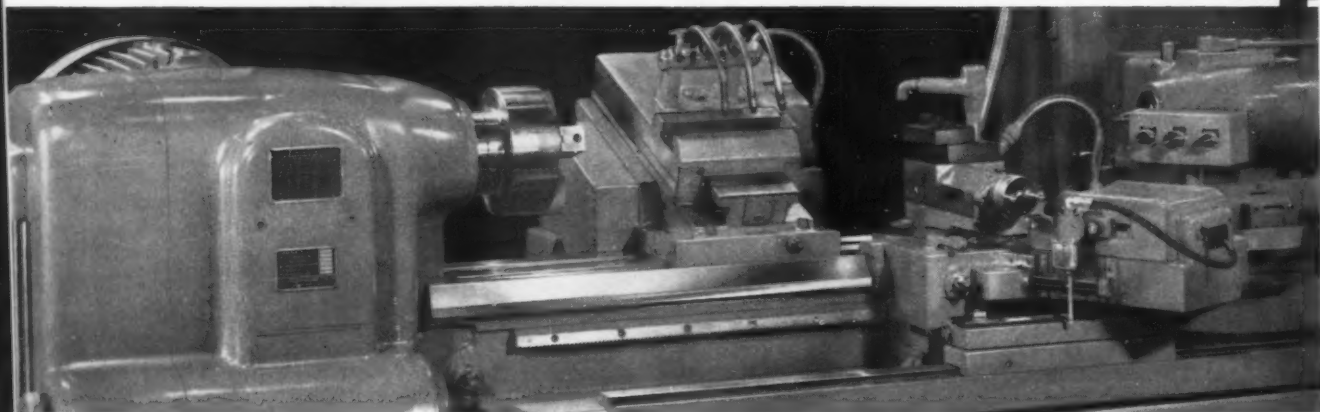
MACHINERY, November, 1957—125



# He's holding

Multi-cycle programmer is the name. And it's only one of many built-in features which make the Monarch Model 21 Mona-Matic the most productive automatic cycle lathe available today.

You can use the Model 21 for a hundred or a million parts. The programmer method cuts setup time to such an extent that switching over from one part to another is accomplished just about as quickly as job change on an engine lathe.



## Flexibility Unlimited

Drive motor may be single speed or two speed. Or inbuilt *constant surface cutting speed* may be provided. This often increases production 30 to 40% on shaft turning, even more on facing cuts and forgings. . . . You can get a *two-position tool holder*; one position for a roughing cut, the other for a finishing cut. Indexing is automatic as a part of the

cycle. Think what this means in increased production and better tool life . . . Might chip disposal be a problem? Then a *power chip conveyor* is for you. It removes chips from the machine automatically . . . Keep chips and coolant under control with a *chip and coolant guard* that functions at will of operator or automatically at proper time during cycle.

# an automatic cycle

The Model 21 has all the power needed to utilize the full productiveness of carbide tooling; has the speed to take advantage of the economies inherent in ceramic tooling.

This machine may be used with equal efficiency on one, two, three or four cut cycle work while the switch from one cycle to another is accomplished in most cases by doing nothing more than changing the multi-cycle programmer and making a few

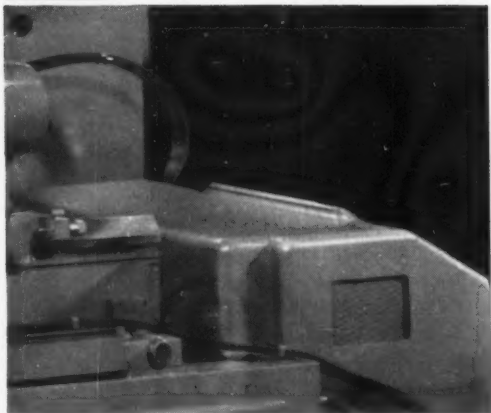
quick readjustments at the front of the machine.

Get all the benefits of the time-proved "Air-Gage Tracer"—the most accurate lathe duplicating device known, so fast in operation that the only cycle speed limitation is imposed by what the tool will stand.

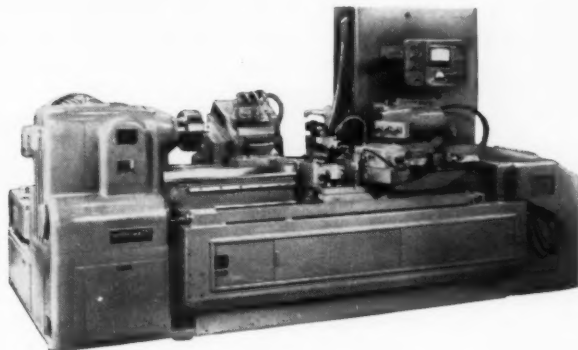
When you buy a production lathe, RESULTS are what you want. That's what you get in the Model 21. Booklet 1808, yours for the asking, tells why in detail. **The Monarch Machine Tool Company, Sidney, Ohio.**

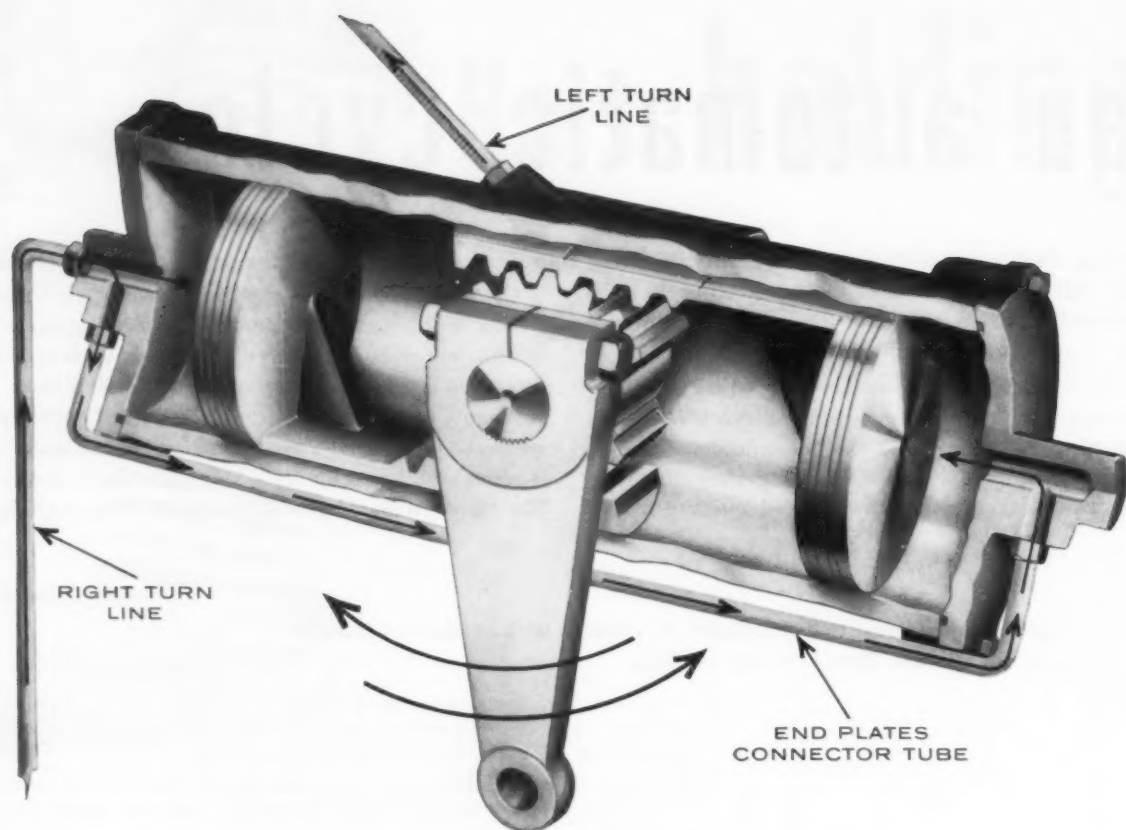
**The above statement that the Model 21 is loaded with production features is not an idle one. Here are some of them.**

- Automatic feed change with up to six different feeds, each of which is infinitely variable and each of which may be made operative at any time during the cycle. This is a Monarch exclusive.
- All feeds adjustable under cut. Such flexibility is desirable on some work where it lengthens tool life and thereby increases day in and day out productiveness.
- "Air-Gage Tracer" utilizes the combination of air-hydraulic control. This accounts for a stylus pressure of only five to six ounces against the template. There is no appreciable template wear; accuracy of template shape reproduction is within  $\pm .001"$  on most jobs.
- All way surfaces flame hardened and ground. Included are bed ways, "Air-Gage Tracer" slide and rear slide way surfaces. The accuracy built in is retained year after year.
- Work piece change speeded by a single lever on tailstock. This is a multiple position lever which in proper sequence controls both the tailstock center and the air operated chuck.
- Rugged rear carriage for auxiliary machining operations, timed to take its cut at any point during the cycle.
- Automatic lubrication; from end to end, all the time.



**Monarch**  
TURNING MACHINES  
FOR A BETTER TURN FASTER . . . TURN TO MONARCH





## Now...a new kind of Power Cylinder to help you cut costs

**T**HE new rotary motion Thompson Power Cylinder provides versatility of application, ease of installation, compactness and efficiency certain to solve many design and manufacturing problems. These features can cut your costs by simplifying production. It is now in use in a leading make of heavy-duty trucks.

Requiring a minimum of space, the Thompson Power Cylinder can be operated wherever hydraulic or pneumatic pressure is available. Operating from 600-1000 psi, at 700 psi it delivers approximately

26,000 inch pounds torque output. These parameters can be varied to obtain a custom installation. Also, over-running clutches, sprockets, gears, chains, etc., are easily adapted to the output shaft to further increase its versatility.

Precision engineered, the Thompson Power Cylinder is as dependable as it is versatile. You can count on a long, continuous, trouble-free life.

To learn more how the Thompson Power Cylinder can save you money in design, manufacture and installation costs, write for our free book-

let. Described are many of its diverse uses and additional benefits. Mail to Thompson Products, Inc., Michigan Division, 34201 Van Dyke Avenue, Warren, Michigan.

You can count on



**Thompson  
Products**

Michigan Division:  
Warren and Portland





1 1/2 times  
actual size

# 220 MILLION PIECES

## FROM THIS 12-STATION TOOL STEEL DIE

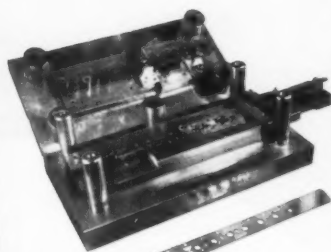


Photo courtesy of  
Werner Die & Stamping Co.,  
Cary, Illinois, makers of this die.

Tolerances on the intricate shaft-mounted spring shown here are plus .003", minus .000" ... no burrs allowed ... and stamping speed is better than 240 a minute. This calls for die-making precision—and a precision die set.

Reliable, consistent precision of the Danly Die Set provides the closure accuracy necessary to the performance of this fine die. After this unusually long run of a precision stamping in a tool steel die, the die set is in good condition.

Danly production methods consistently maintain the highest standards of die set precision through individual control of every critical dimension. Thousands of fine tool and die shops agree that the finest die set obtainable is usually the lowest cost insurance on any die-making investment. Find out how Danly precision can save money for you.

**DANLY MACHINE  
SPECIALTIES, INC.**  
2100 S. Laramie Ave. Chicago 50, Illinois

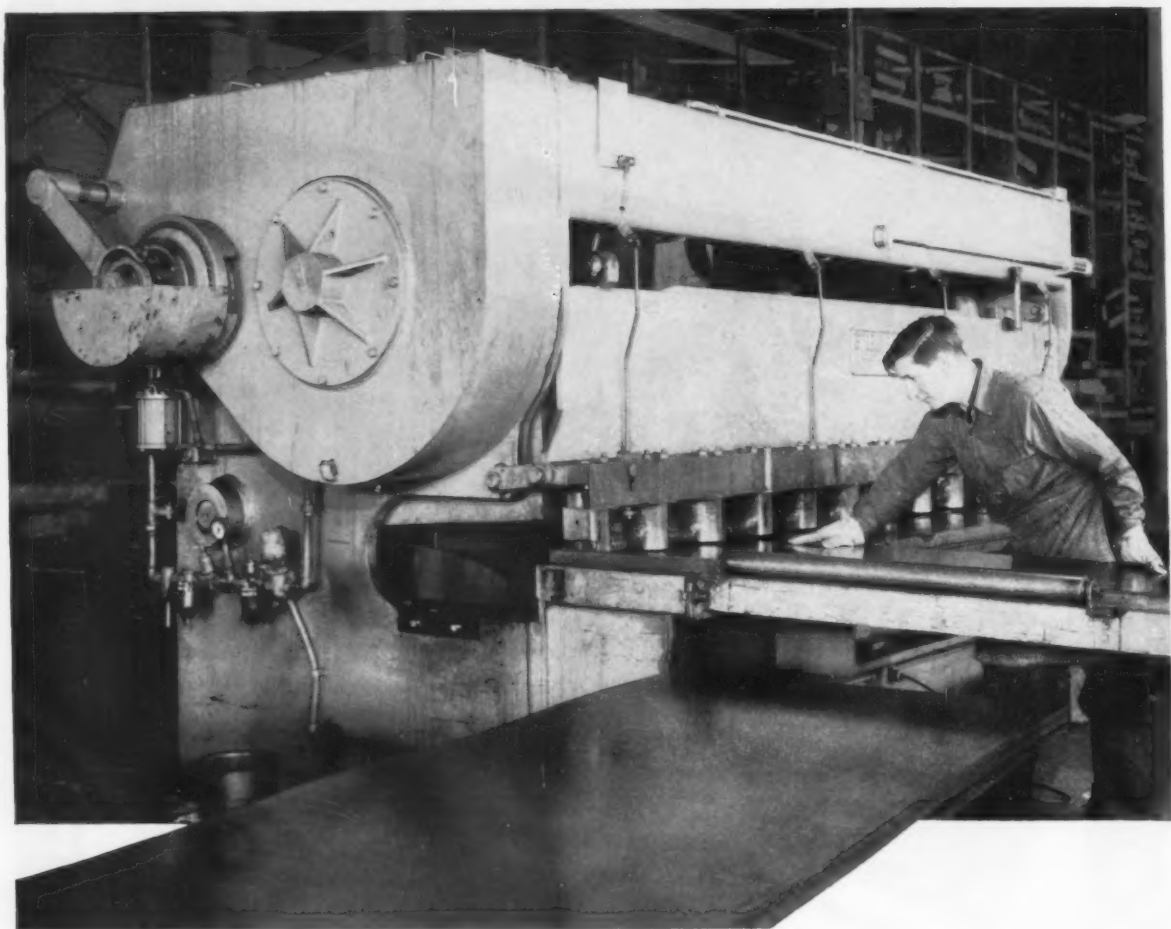


Write for new folder on  
"The Importance of Die Set Precision"

Lists and discusses  
all critical dimensions  
... shows how and why  
consistent Die Set precision  
is vital in every die-making  
operation. Send for a free copy.

.002 inch clearance between knives produces sharp, straight, accurate edges in the 18 gauge metal cut on this Steelweld Shear. The clear-

ance is easily increased to suit heavier metal. The shear operator is not confined to some average compromise clearance.



## Cuts **1200 PIECES** Per Hour

Farm Equipment Manufacturer Gets Sharp, Accurate Cuts  
Because of Steelweld's Exclusive Knife Clearance Adjustment

**M**ASSEY-HARRIS-FERGUSON, Ltd., Toronto, well known throughout the world as a leading manufacturer of farm implements does much of the cutting required for the various steel parts with Steelweld Shears.

Massey-Harris-Ferguson obtains the best possible cuts because the knife clearance can be adjusted exactly to suit the thickness of metal being cut. It is not necessary to depend upon some compromise difficult-to-change knife setting with Steelweld Shears, as they are easily adjusted to the correct clearance in 10 seconds.

*Write for free copy of Catalog No. 2011  
Gives construction and engineering details*

Illustrated is one of the many cutting jobs for which Steelwelds are used. 108-inch lengths of 18 gauge steel are cut into six 18-inch pieces at a rate of 1200 per hour. Knife clearance setting for this work is .002 inch. This shear has been in operation 24 hours a day, six days a week, for many years.

**STEELWELD**  
**PIVOTED**  
**BLADE** **SHEARS**

STEELWELD DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 5456 E. 282 ST. • WICKLIFFE, OHIO

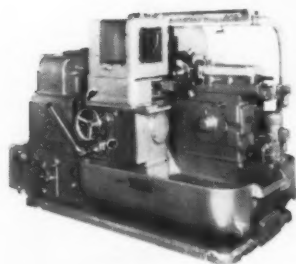
## DO YOU NEED FLEXIBILITY?



# TAREX HAS IT

## ...AND HERE'S HOW!

➤ The illustration shows a Tar-H Machine with 2-9/16" bar capacity, 7" dia. chucking capacity, and ...



- A front slide with length- and cross-wise feed, using standard camming
- A rear slide that will single point angles up to 30°
- Two vertical slides
- A hydraulic tracing unit that will generate irregular surfaces with single point tools
- A multiple drillhead with drill speeding feature, spindle brake and positioning
- An 8-position turret

ALL THESE FEATURES, AND OTHERS, VARIABLE AT WILL!

# RUSSELL, HOLBROOK & HENDERSON, INC.

292 Madison Avenue, New York 17, N. Y.

# There's an **AJAX** FORGING MACHINE . . .

— For Every Field of Upset Forging in Industry —

**BUILT IN  
TWELVE  
SIZES  
1" to 12"**

Choose from a complete line of AJAX Forging Machines to make the forged parts you need—

**AUTOMOTIVE** — Transmission  
Gears—Flanged Axle Shafts—  
Crankshaft Flanges & Drag Links

**AIRCRAFT**—Cylinder Heads &  
Jet Blade Blanks

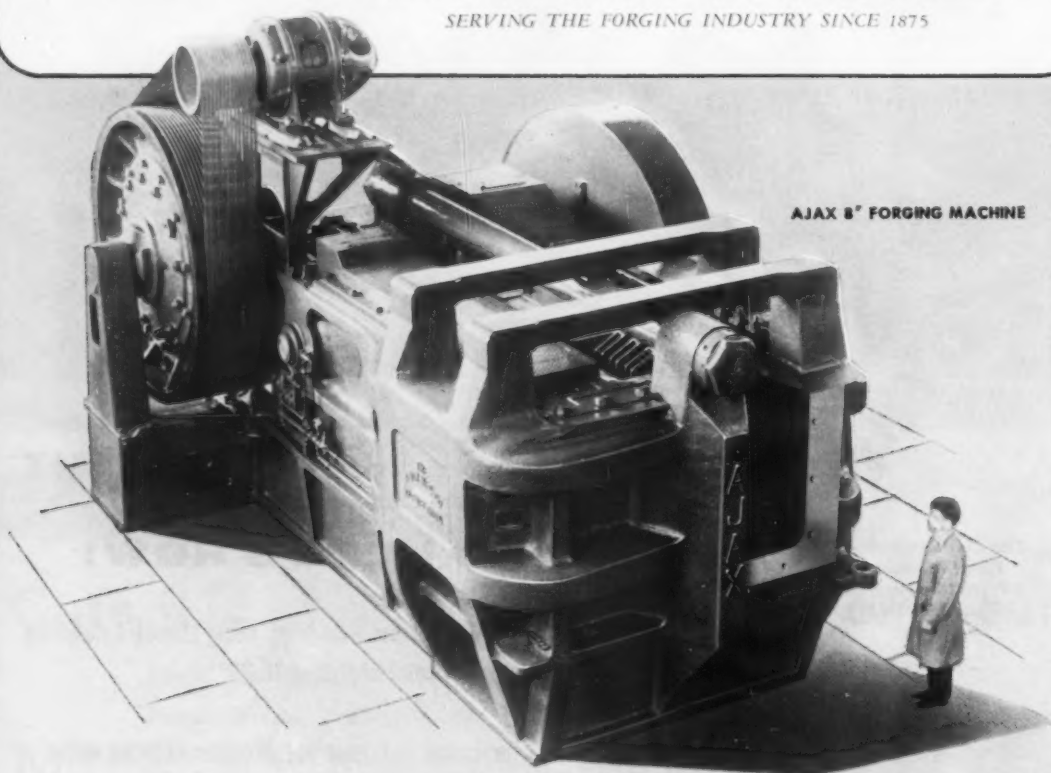
**AGRICULTURAL**—Implement &

Tractor Forgings

**RAILROAD**—Freight Car Brake  
Levers—Grab Irons & Brackets

For Higher Production and  
more accurately Forged Parts—  
Specify AJAX Forging Machinery

*SERVING THE FORGING INDUSTRY SINCE 1875*



**AJAX 8" FORGING MACHINE**

**AIRCRAFT**



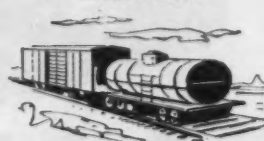
**AGRICULTURE**



**AUTOMOTIVE**



**RAILROAD**



## **AJAX METAL WORKING MACHINES**

FORGING PRESSES — FORGING MACHINES — FORGING ROLLS — AJAX-HOGUE WIRE DRAWERS

**THE AJAX MANUFACTURING COMPANY . . . . . CLEVELAND 17, OHIO**

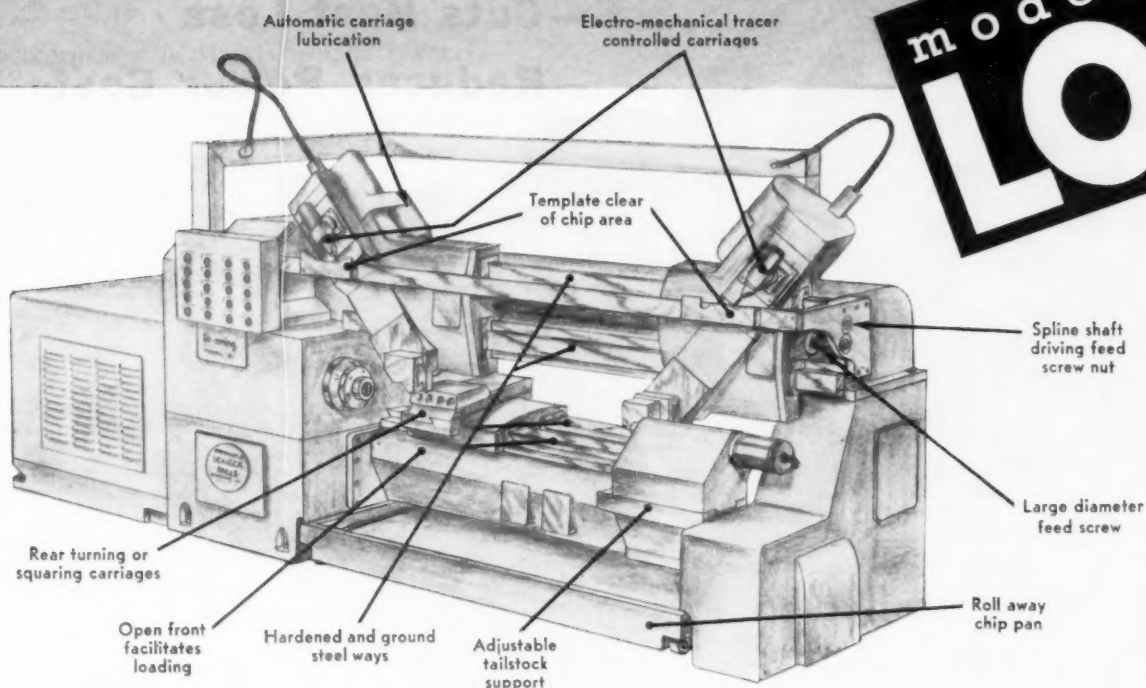
**CHICAGO OFFICE: 110 S. DEARBORN ST., CHICAGO 3, ILLINOIS**

**W. P. WOOLDRIDGE CO. • BURLINGAME, CAL. • LOS ANGELES 22, CAL.**



# NOW AVAILABLE

model  
**LQ**

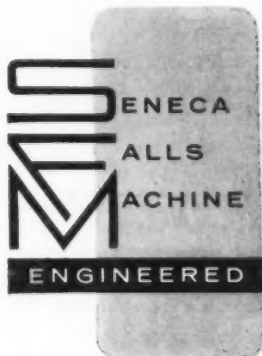


## a fast-cycling, double-way automatic tracer lathe

### CHECK THESE COST CUTTING FEATURES

PHONE, WIRE OR WRITE  
FOR COMPLETE  
INFORMATION

- Simplified changeover features for reduced set-up time.
- Feed rate may be automatically changed during cutting cycle.
- Streamline design for efficient chip guarding.
- Screw feed to all carriages.
- Four-speed head with automatic changeover.
- Large chip flow area.
- All templates clear of chip area.
- All ways hardened, ground and replaceable.
- Open front design facilitates loading and unloading.
- Straight line diameter adjustment for tracer tools . . . no shoulder length change to correct.
- Very high spindle speed.
- Very fast rapid traverse for carriages.



ENGINEERED FOR PROFIT

**SENECA FALLS MACHINE CO.**

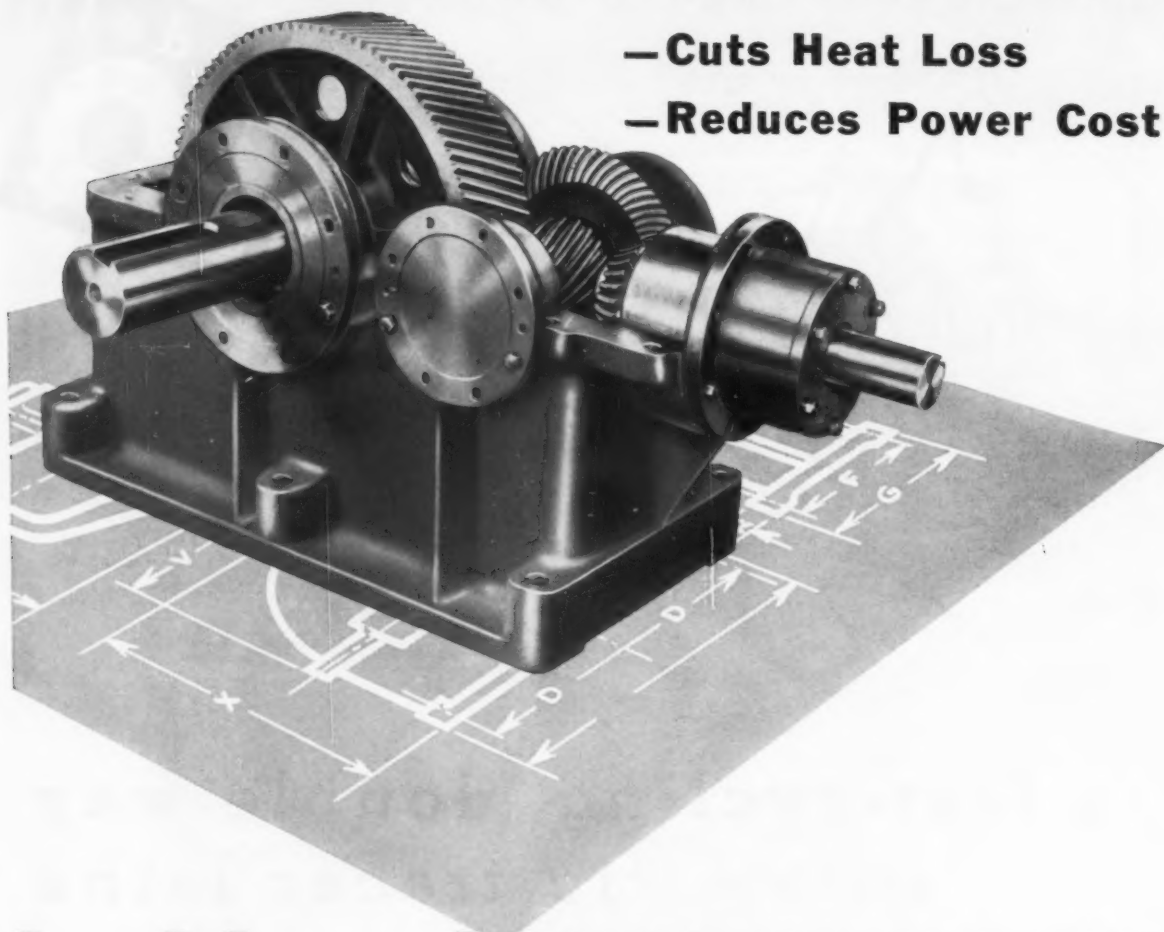
SENECA FALLS, NEW YORK

Lo-swing Lathes and Seneca Falls Machine Tools, Automation and Electronics

# Maximum Efficiency In Right Angle Drives

—Cuts Heat Loss

—Reduces Power Cost



**[ advanced design ] + [ manufacturing skill ] = lowered power consumption and reduced prime-mover cost**

A glance at the illustration will readily convince you of the plus features of these quality "custom-built" units. Spiral-Bevel and Helical Gearing assures quiet operation at high speeds, and increased tooth strength. Pinion shafts are integral with gears and finished to close tolerances by grinding. Ball or Roller Bearings support shafts and are designed to take combined radial and thrust loads. Housings are quality grey cast iron with all points of stress properly ribbed to reduce deflections and stresses to minimum; also housing design provides adequate oil reservoir and large radiating surface for thermal capacity. Vertical Units are also available, and are equipped with "dry well", which keeps oil from leaking at low speed shaft.

Hundreds of Philadelphia Spiral-Bevel Helical Units are used throughout Industry, driving Paper Mill Machinery, Conveyors, Blowers, Fans, Machine Tools.

Philadelphia Spiral-Bevel Reducers may be had in Horizontal or Vertical Types; Single, Double or Triple Reduction types, to meet every possible requirement.

Send for complete Catalog #SB-57, which describes all types of Horizontal and Vertical Spiral-Bevel Helical Units.



## phillie gear<sup>®</sup>

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.

Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS  
Virginia Gear & Machine Corp. • Lynchburg, Va.

# Natco Naturals

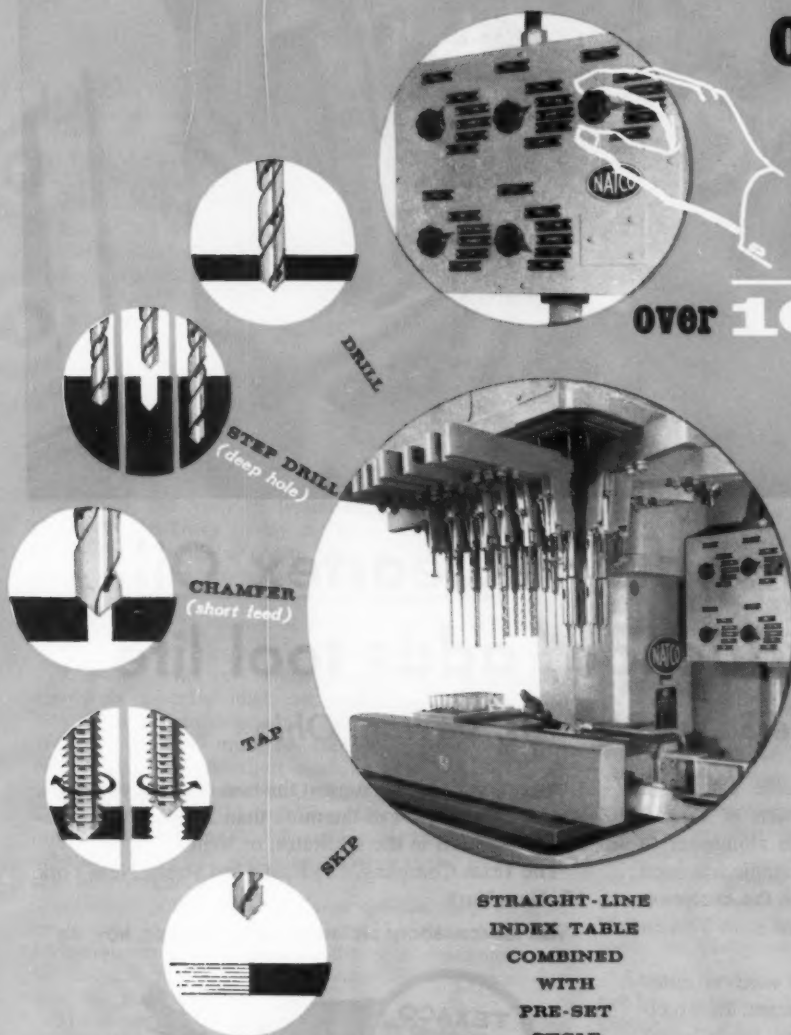
Cost-Cutting Ways

You Can Use

Standard Multi-Spindle Natcos

Any time your parts require machining *more than one hole*—drill, bore, face or tap—it may well be a "Natco Natural." Your standard Natco will produce substantial savings in a surprising number of situations, *even in small job-shop lots!* Call in your nearby Natco field engineer; he'll tell you in short order whether you've got a "Natco Natural" there.

## NOW...Set up quickly with a twist of the wrist



**5 cycles**  
**5 positions**  
**over 100 combinations**

The five-position table mounted on a Natco H-6 adjustable spindle machine equipped with selector control panel makes it possible for the operator to pre-set over 100 machining combinations. Thus the capacity of the machine is greatly increased in number of holes, in complexity of hole patterns, and in variety of machining operations. Machine investment is kept at a minimum for the volume of work produced.

### Select either of

- 2** DEPTHS OF FEED  
automatically
- 2** FEED RATES  
automatically
- 2** MOTOR SPEEDS  
automatically
- 2** INDIVIDUAL SPINDLE  
SPEEDS PLUS NEUTRAL

STRAIGHT-LINE  
INDEX TABLE  
COMBINED  
WITH  
PRE-SET  
CYCLE  
SELECTOR



Standard multi-spindle Natcos range from 1 hp, 10-spindle machines to 50 hp machines with up to 72 spindles. Spindles in standard Natcos are driven through universal joints and located by either adjustable arms or bored slip plates.

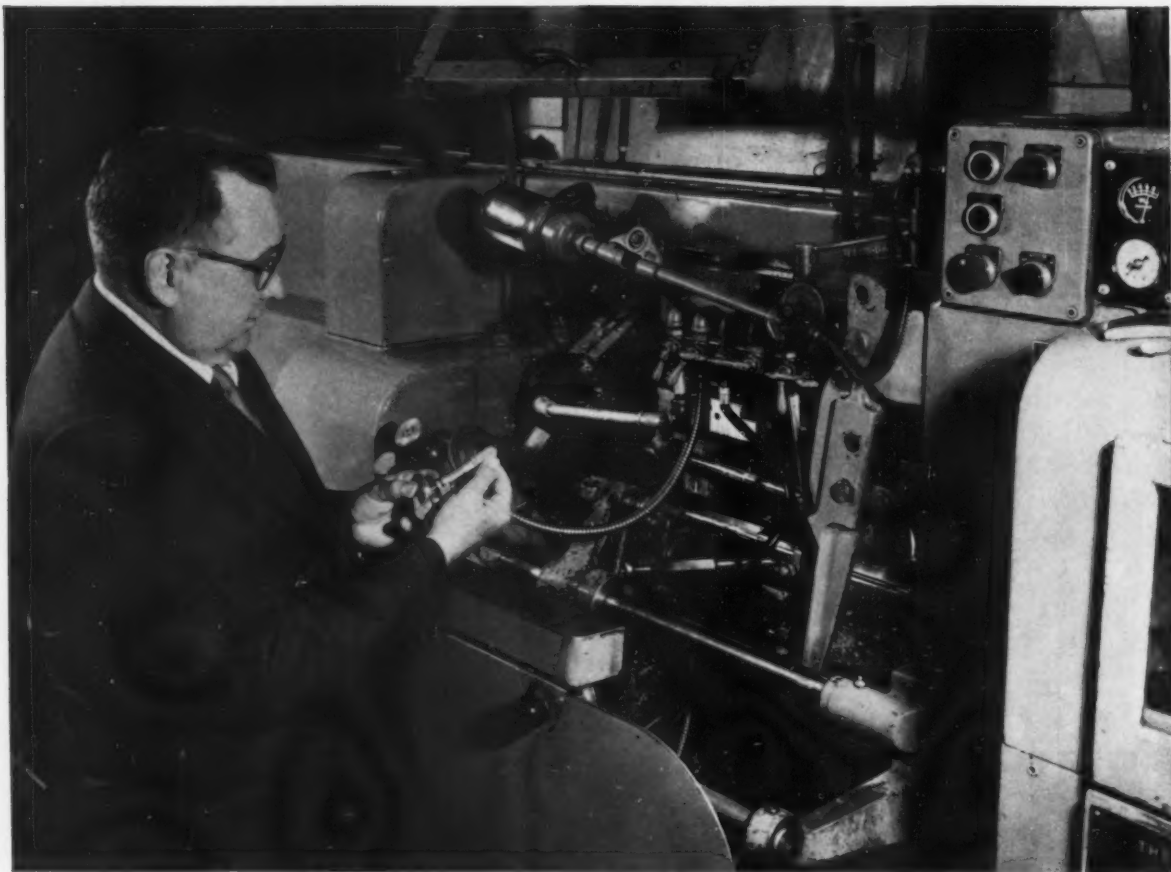


**National Automatic Tool Company, Inc.**

Richmond, Indiana

Multi-spindle drilling, boring, facing & tapping machines. Special machines for automatic production.

Call Natco Offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland, Los Angeles; distributors in other cities.



## Clear, transparent Cleartex Oil boosts production, adds tool life

*for Triangle Screw Products, Dayton, Ohio*

Triangle Screw Products employ a sizable battery of automatics to produce screw machine parts of various shapes and sizes, in metals ranging from aluminum to stainless steels. For over fifteen years Triangle has used *Texaco Cleartex Oil* for all this work with the exception of the stainless steels which are machined with *Texaco Sultex Cutting Oil*.

Dual-purpose *Texaco Cleartex Oil* is used in automatics as cutting fluid and machine lubricant. Its excellent load carrying properties, and stability, mean better machining and better machine lubrication. And its transparency makes work inspection faster and easier.

There's a complete line of *Texaco Cutting, Grinding and Soluble Oils* promptly available to help you do all your machining better, faster, at lower cost. Let a Texaco

Lubrication Engineer suggest the best ones for your jobs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

VISIT TEXACO—BOOTH 365—METAL SHOW—CHICAGO, NOV. 4-8



### LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)



- Super Slashes
- Super Salesman
- Superimposed Subjects



## Keeping up with Washington

Loring F. Overman

**D**EPARTMENT of Defense experts are exploring the premise that improved machine tools can effect some of the important economies required by Washington budget-cutters.

For the present, at least, Defense Department concern over saving money appears very real. An example is the recent order cutting another 100,000 from the military forces and 35,000 to 40,000 more from DOD's civilian payrolls. The cut, starting now and to be completed before June 30, 1958, is the second 100,000-man cutback ordered.

The two cuts—the previous one was ordered last July 16—are expected to reduce defense payrolls and operating costs by \$1,000,000,000. Additional personnel reductions are not unlikely, DOD spokesmen indicated, if the budget ceiling for the Department of Defense remains fixed at \$38,000,000,000.

Tactically, the slash requires the Air Force to drop four wings; the Army to de-activate one additional division; and the Navy to lay up more ships. Financially, the move sets up a chain reaction of cutbacks and economies of concern to every defense contractor.

### Super Salesman

"Clearly," said one DOD spokesman, "it becomes absolutely essential that companies take a real hard look at their management methods and techniques. Waste and 'frills' must be eliminated from the front office down to the smallest machine shop."

The speaker—Lieutenant General C. S. Irvine, Deputy Chief of Air Staff (Materiel)—explained that economies must include elimination of engineering time not directly essential to the job, trimming of labor costs, and reduction of overtime.

Although pointing out that new defense facilities must be limited to top priority projects, Lieutenant General Irvine observed that "new tooling and equipment can be justified on the basis of greater efficiency and less total cost to taxpayers."

The general then proceeded to explain how machine tools with numerical controls can go a long way toward meeting the three requirements previously cited—engineering savings, increased efficiency, and reduced labor costs.

### Superimposed Subjects

Superimposed upon Washington's primary pattern of politics, budgets, and defense projects are many related subjects of importance to the machinery industries. Among these topics are the following:

**Capital Spending**—it appears to be leveling off after ten years of almost uninterrupted climb. Both Securities and Exchange Commission and National Industries Conference Board agree. The cut in defense spending is one reason advanced, and another is that the present capacity of industry exceeds the apparent demand by approximately 15 per cent. A continuous rise in population could soon absorb this surplus, however.

**Water Sources**—in 1975 and beyond will continue to be a subject of official concern. Increasing population and changing patterns of living and working present a challenge to machine industries whose interests lie in the field of public utilities.

A new report of the Water and Sewerage Industries Division, Business and Defense Services Administration, outlines the problem. By 1975, according to the report, public water utilities will serve 148,000,000 persons; will require 28,000,000 kilowatt hours of electrical energy, 86 per cent above 1953, when 106,000,000 persons were served. Copies of the report, "Summary of Information on Public Water Supplies, Power and Fuel Requirements, 1915, 1953, 1975," are available at 10 cents each from the Sales and Distribution Branch, Commerce Department, Washington 25, D. C.

**Machinery Replacement**—theories are discussed in a new Army Ordnance publication. The report, "On the Theory of Replacement of Machinery With Random Failure Time" (PB 121424), may be ordered for 75 cents from the Office of Technical Services, Commerce Department, Washington 25, D. C.

**Role of Negotiated Contracts**—in Department of Defense buying may be defined by legislation when Congress reconvenes. Proposed legislation would not limit necessary negotiated buying, but would define areas where such negotiations appear to serve no useful purpose. The House is expected to pass such a measure easily, but the Senate may balk.

**Annual Renewal**—of the Defense Production Act may not be effortless in 1958. The Senate Judiciary Antitrust Committee, with Justice Department concurrence, has indicated it opposes DOD authority to grant certain antitrust immunities to groups of companies working on government contracts.

**Machining Problems**—will multiply during the next decade as defense agencies strive for materials which can stand up at speeds of approximately ten to fifteen times that of sound. The problem will present industry with a completely new set of conditions, according to Colonel John H. Dick, chief of the Manufacturing Methods Branch of the Industrial Resources Division, Air Materiel Command.

**HARDINGE**  
ELMIRA, N.Y.



## **HARDINGE EASY READING BLACK and WHITE DIALS**

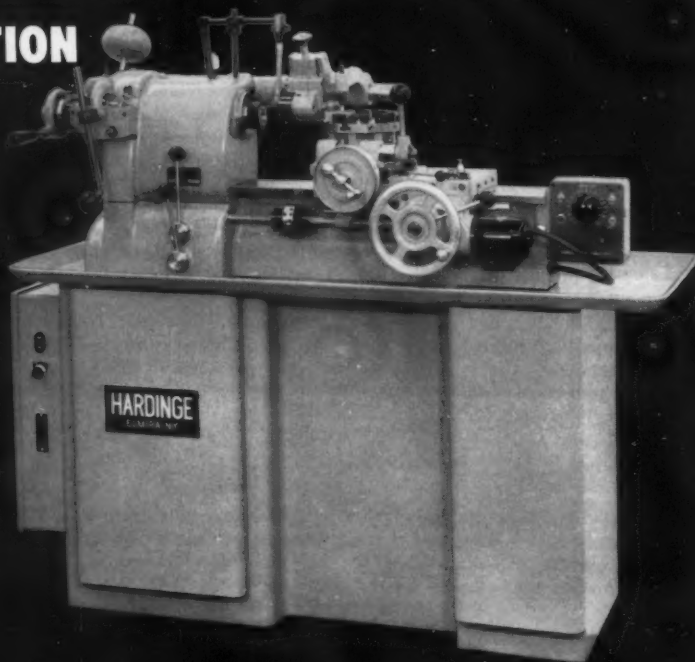
**mean INCREASED PRODUCTION**

... **HARDINGE** developed these fast setting easy reading **black and white dials** — they assure maximum accuracy with high production.

**Pioneered** with the Hardinge High Speed Precision Chucking Machine model HCT shown here — **Hardinge black and white dials** are now standard equipment at no extra cost on all of our tool room and production machines.

Invest in Hardinge equipment for product improvement and increased production. Ask for bulletin on our tool room and production machines.

**HARDINGE BROTHERS, INC.**  
ELMIRA, N. Y.



## *Well Done, WOC's!*

**T**HERE is nothing more heartwarming than receiving praise for work performed conscientiously and efficiently. Conversely, there is nothing more aggravating than to hear derogatory statements about a man who has done a meritorious job.

When the Business and Defense Services Administration was established in Washington in 1953 to coordinate the activities of the Government and industry in mobilization for preparedness, the call went out for industrial executives who could serve as heads of twenty-five divisions of the Administration. Each of these executives was to serve a tour of duty for six months without compensation—hence these men were known as “WOC’s.”

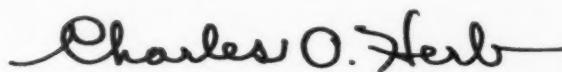
The Government received wholehearted cooperation from the different branches of industry even though individual companies sacrificed considerable brain power in performing what they considered a patriotic duty. This practice is now being discontinued as the WOC’s are being replaced by government career men.

Men of exceptional qualifications were supplied to the Government by machine tool builders and machine tool distributors for the BDSA assignments in the Metalworking Equipment Division. These men were capable


executives of outstanding integrity who performed their duties without personal considerations. In most cases, they were separated from their families for the duration of their tour of duty.

As so often happens when politicians see an opportunity for personal publicity, there have been recent criticisms by members of Congress that seem to impugn the honesty of the men who have served in the capacities outlined. Critics have pointed out that the WOC’s were in a position to tip off their companies about up-coming government projects and to influence the awarding of contracts to their own firms. There have been no presentations of evidence that such manipulations ever occurred. There were, in fact, few such opportunities.

As we review the roster of high-minded men who headed the Metalworking Equipment Division, we do not believe that any of them ever indulged in such questionable practices. Actually, we are acquainted with one instance where the director knew of an \$80,000,000 project for which his company could have made bids—yet his company refrained from doing so because of possible misunderstanding of propriety. Shabby treatment accorded men who should receive credit for a job well done is always a highly deplorable situation.



EDITOR



## As positive as a fingerprint— certified alloys from Ryerson



Alloys from different furnace heats can vary in hardenability and other working characteristics. But with Ryerson alloys you *know* the differences—before you start production. Ryerson alloys are marked with symbols identifying them with the particular heat from which they were rolled. As a Ryerson *extra* you get a dependable special report showing:

**1. Heat analysis.** Not just the chemical range for the type of alloy, but the specific analysis

of the heat from which your steel was rolled.

**2. Tested Hardenability.** Not just the average hardenability for the alloy, but the actual Ryerson-tested hardenability for the particular heat . . . as quenched, and at three draw temperatures.

For more information about Ryerson alloys and the Ryerson Certified Alloy Steel plan, call your nearby Ryerson plant.

*Principal products: Carbon, alloy and stainless steel—bars, structurals, plates, sheets, tubing, industrial plastics, machinery and tools, etc.*



# RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND  
DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE



# Getting more from your PORTABLE AIR TOOLS

Well-defined maintenance procedures lead to better production from portable air tools. Merely keeping the tools running is not enough — their efficiency should always be kept between 80 and 100 per cent of original tool power for satisfactory performance.



HUGH L. WHITEHOUSE, Research Engineer  
Rotor Tool Co., Cleveland, Ohio

**W**HEN using a portable air tool, production output depends on three things: the proficiency of the operator, selection of the right tool for the job, and the effective power of the tool. With the tool functioning at full power and properly applied, production is high. If the tool is allowed to drop much below its rated power, the output of the operator is low.

The part of the problem to be considered is how to keep portable air tools operating at, or close to, full power. This is maintenance in its broadest sense. Perhaps the simplest solution would be to have an inexhaustible supply of new tools from which the operator could draw when-

ever a power loss develops in the tool being used. This course of action can be compared to that of buying a new car each time the present one requires tuning up. Cost of maintenance is part of the cost of production; the problem, then, is to keep tools operating at full power and at the lowest cost.

What standard for effective power can be set which would not be prohibitively expensive, and yet would keep abreast of production requirements? Since, in practice, portable air tools have a margin of reserve power built into them, 80 per cent of new-tool power would seem a reasonable goal.

How long can a tool be expected to keep oper-



**Fig. 1.** This extreme misuse of couplings and hose is not uncommon. Their small size causes air pressure to drop from 88 psi at the needle gage to 35 psi at the pipe tee. The tool is receiving a flow of less than 40 cubic feet per minute.

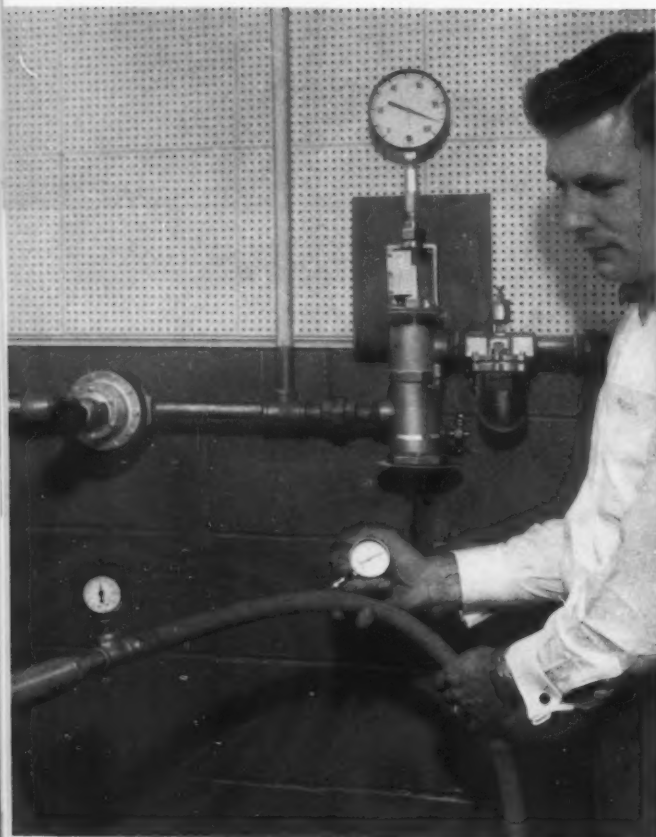
ating at this power before major repairs become necessary? In some production applications a portable air tool, receiving proper care, will last for five years or longer before maintenance costs rise sharply. The tool will have paid for itself in a far shorter period and, with the constant improvement in tools today, it may well be obsolete before that time. In severe three-shift operation, tool life may be considerably shorter—approximately two years. It must be stressed that these estimates of useful tool life assume sound maintenance procedures and may vary with the work load. To meet these standards of efficiency and longevity, maintenance procedures should be broken down into three areas: preventive maintenance at the point of use, scheduled maintenance, and major maintenance problems.

#### ***Preventive Maintenance at the Point of Use***

It is desirable to be able to predict when or how a tool is going to lose power and take preventive steps, rather than wait until production output falls or the tool stops running. There are three major factors around which tool efficiency and tool life revolve—adequate air pressure at the tool; proper lubricant supply in the air stream; and careful, sensible handling of the tool to avoid physical abuse.

**Air Pressure**—The first step in maintaining full efficiency of any equipment is to ascertain that adequate power is delivered from the source to the tool. For their power, pneumatic tools depend on maximum pressure difference across the tool for a given air flow and are generally designed and rated for a pressure drop of 90 psi. Assuming that the compressor has adequate capacity and that sufficient air at proper pressure is available in the main lines, the problem is to see that proper hose sizes are maintained and that no pressure drops occur upstream of the tool (between the tool and the compressor) through fittings and couplings that are too small.

Air pressure can be checked with a gage unit consisting of a standard pressure gage connected to a hypodermic needle. This needle is injected



**Fig. 2.** Proper size hose and nipple is being used. Line pressure of 90 psi at the needle gage only drops to 85 psi at the pipe tee. The tool is now using an air flow of 74 cubic feet per minute.

**Fig. 3.** Dirty air-strainer screens will cause a severe reduction in tool power. If these screens are not cleaned regularly, there is a tendency for the operator to puncture them, as shown, in an effort to restore tool efficiency.

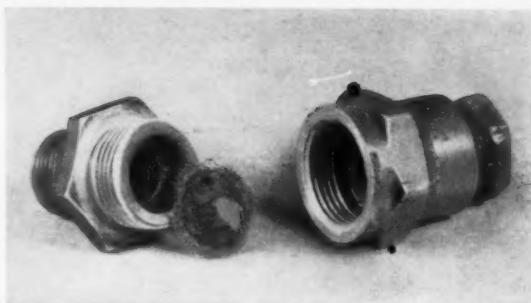
into the hose near the tool. Better still, a pipe tee and pressure gage can be connected directly to the tool inlet. With the tool running under full load, the gage should read 90 psi. Below this figure, power losses are approximately 1 per cent per psi.

In Figs. 1 and 2 are illustrated two hose and coupling combinations. An extreme, but not uncommon, example of the misuse of coupling and hose can be seen in Fig. 1. Both are far too small for the intended use. With the tool—an 8-inch heavy-duty grinder—running under load, line pressure leading to it is a normal 88 psi as registered on the gage and hypodermic needle unit. However, air pressure actually reaching the tool inlet has dropped to 35 psi as registered on the gage located on the tool side of the coupling. The flowmeter mounted on the wall indicates that only 40 cubic feet of air per minute is passing through the tool, reducing operating efficiency to only 40 per cent of full power.

A noticeable improvement in the air supply entering the tool was obtained by replacing the undersize hose and coupling with those of adequate capacity, Fig. 2. The big change was in the pressure on the tool side of the coupling, which registers 85 psi as compared to the reading of 90 psi on the needle gage. An air flow of 74 cubic feet per minute is now passing through the grinder.

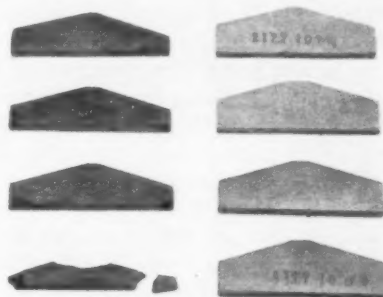
Air pressure may also drop at the tool when screens or filters become clogged with dirt from the lines. These should be checked and blown out periodically. Poking holes through them, Fig. 3, or pulling them out entirely is not a solution.

**Lubrication**—Lack of lubrication accounts for an alarmingly high percentage of all tool failures, which are usually preceded by progressive losses in power. Perhaps the purpose of the lubricant is not fully understood. Oil in the air stream entering the moving portion of the tool does five vital things: it deposits a low-friction molecular film between the rubbing surfaces; it assists in removing excessive heat from localized areas; it flushes out any dirt from the air stream or motor; it provides a sealing action between high- and

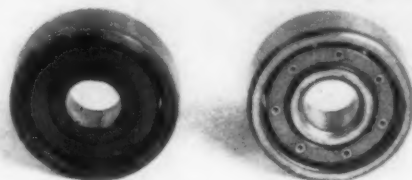


low-pressure pockets in the motor; and it retards rust caused by moisture in the air stream. Use of an emulsifying oil (usually specified by the tool manufacturer) is a must. In theory, an emulsifying oil surrounds each droplet of water and, although the emulsion may eventually break down, rusting is greatly inhibited.

Oil not only prolongs the life of the working parts, but is also vitally necessary for developing power in the motor. Progressive deterioration of an air motor running without oil usually follows this sequence: (1) drop in speed and power



**Fig. 4.** (Above) Set of blades (left) that have been run without oil are compared to a set of new blades (right). Uneven blade wear and chipped corners can be seen. The blade at lower left burst through the cylinder liner.

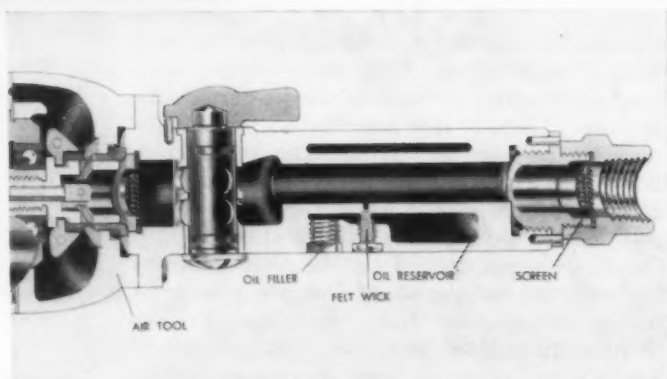


**Fig. 5.** Adequate lubrication is essential to the efficient operation of an air tool. A ball bearing that has failed due to lack of lubrication (left) is seen next to a new bearing (right).



Fig. 6. (Left) An air filter and line oiler should be installed in the main air line. Here, a pump type oil can is being used to fill a typical line oiler.

Fig. 7. (Right) An oil reservoir is built into the handle of this air tool. It should be filled at least once during each shift. During scheduled maintenance periods the felt wick is replaced if it has become hard.



caused by loss of the sealing function of the oil; (2) heating of the cylinder liner due to increased blade friction (causing blade charring); (3) additional power drop caused by gumming deposits of blade char and dirt from the air line (which is no longer flushed out); (4) scoring and wearing of the cylinder liner caused by accelerated abrasive action of the blades; and (5) further damage resulting from worn blades riding at an angle, gouging the liner, then eventually breaking or falling out of the rotor and stalling the tool.

A set of blades that have gone through this progressive cycle are shown at the left in Fig. 4. The uneven wear and chipped corners can be noted. The lower blade broke and burst through the cylinder liner. At the right, four new blades are shown for comparison.

All open type ball bearings, which depend on lubrication from the air stream, will also be ruined. A ball bearing that has failed because of insufficient lubrication is shown to the left of a new bearing in Fig. 5.

This may seem to be a dark picture, but it is a common one. Preventive steps, however, are fairly simple. A reliable air filter and line oiler should be installed and maintained. A typical line oiler is shown being filled in Fig. 6. Also, oil reservoirs in the tools, Fig. 7, should be filled at least once per shift.

**Abuse**—Although the abuse of portable tools is not as widespread as lack of lubrication, some shops find that a large percentage of tool failure is traceable to mishandling. Tools that get banged about exhibit the same power losses that accompany poor lubrication. It is common to see tools dropped, dragged, thrown, used as hammers (Fig. 8) and prying devices, or left on the shop floor. This can be prevented by placing tool cradles at strategic spots and by using balancers where possible.

### Scheduled Maintenance

The purpose of scheduled maintenance, like maintenance at the point of use, is to keep tools operating at 80 per cent of their original power or better, and this with a minimum of repair costs, tool costs, and down time. It consists of checking tools in the maintenance department at regularly scheduled intervals and replacing parts which, if left in, would soon cause power losses. In this sense, it is a type of preventive maintenance.

**Control Procedures**—The first step for scheduled maintenance is to establish procedures for getting the tools into the tool crib for inspection and then back to the production line. Control can be set up with tool serial numbers on file



cards that show the dates a tool should be returned for checking and also its history of replacement parts. Simpler codes, such as different colors on tools—red ones to be turned in the first and fifteenth of the month, blue ones the seventh and twenty-second, etc.—can be worked out. The important thing is that the tools get to the tool crib regularly.

In Fig. 9 is a plan for a tool maintenance crib to service fifty to seventy-five tools. An area 15 feet by 12 feet is required. The plan emphasizes the flow of tools from the incoming window to the outgoing window, with separate facilities for repair, test, parts stock, and records. Parts lists and assembly drawings of all the tools in use must be on hand.

Stocking of spare parts is always an expensive procedure. It has been found that by having a surplus of complete tools—10 to 20 per cent of the number regularly in use—a minimum number of major parts need be kept on hand as most can be ordered when needed. Stocks should be kept, however, of regularly replaced items such as blades, bearings, fasteners, and gaskets. These items are relatively inexpensive. A maximum-minimum inventory system showing the maximum quantity of each part to be stocked and the minimum quantity before re-ordering has proved successful in a number of places.

**Inspection and Replacement Procedures—**When checking over a tool, the first thing to look for is dirt or gummy deposits in the motor. This may be a sign of extremely dirty air, but is far more likely an indication that the tool has not been receiving sufficient oil. Screens and filters should be cleaned. Felt wicks in the oil reservoirs should be cleaned, or replaced if they have become hard.

Blade inspection is important. If they are shorter than the rotor they should be replaced. Blades must provide an air seal not only against the cylinder liner, but also along the end plates. The blades should be from 0.002 to 0.004 inch shorter than the cylinder. If they are 0.008 to 0.010 inch shorter, a 10 per cent power loss can be expected.

Extreme wear on the long edge of the blade again indicates insufficient oil. Such blades should be replaced, and, furthermore, the lubrication system on the line should be checked. Some shops replace the blades at regular intervals whether the need is apparent or not. This is unnecessary

if inspection techniques are understood, but it does recognize the fundamental fact that worn blades mean poor tool performance.

In a tool maintenance crib, precautions should be taken to see that work surfaces and assembly tools are free from filings or grit. Sealed bearings should not be washed in a solvent. Open type bearings should be washed only in a clear solvent, then oiled. If a bearing seems rough or stiff when turned by hand, replacement is called for.

More important, if any radial play is evident between the inner and outer races, the bearing should be replaced. Radial play can cause vibration, rubbing of metal parts, and loss of air seal at the line where the rotor is tangent to the cylinder liner. Any of these conditions will cause significant power loss. It is difficult to assign a definite time schedule for bearing replacement because of varying load conditions.

A special word is necessary on impact-wrench clutch parts. Because of the severe stresses inherent in impact-wrench operation, clutch parts often break. The key here is to replace not only the broken part, but to examine the impact surfaces of the other parts, including sockets and drives. If these surfaces are upset or badly worn, the balance of component forces at impact will be upset, reducing the output of the wrench and often leading to further breakage. Replacing a worn, relatively inexpensive part may often in-



**Fig. 8.** A large percentage of portable tool failures can be traced to mishandling. This tool, in service only a few weeks, was used as a hammer. It no longer operates.

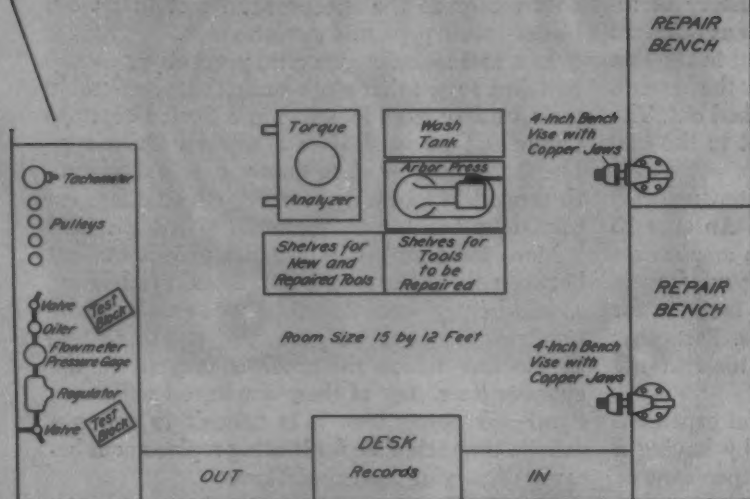


Fig. 9. Plan for a maintenance crib to service from fifty to seventy-five air tools. Note the individual in and out counters and separate facilities for repair, test, stock, tool storage, and records.

crease the output of the tool and prevent failure of a more expensive part.

Check governor bushings for wear and replace if necessary. Air leaking through a governor bushing and by-passing the governor valve will make governor action sluggish, with tremendous losses in power. It may cause a dangerous over-speeding condition which cannot be remedied by adjusting the governor.

A simple and fairly reliable power check can be made on a governed tool by loading it and observing (on a tachometer) the speed at which the governor opens up. If it is less than 90 per cent of the idle speed, the tool is not delivering power at optimum cutting speed and production output will drop severely. Before a tool is returned to the line, free-speed and power checks at a given load and speed should be made.

### Major Maintenance Problems

If the programs outlined are followed, need for major maintenance will diminish sharply and most tools will give years of service before major overhaul is required. Tools wear out even with the best of care, however. Parts such as rotors, spindles, gears, cylinders, end plates, housings, and handles need eventual replacement.

Some users make major repairs in their own maintenance department after getting an estimate of part costs. Others prefer to send the tool back to the manufacturer (regardless of resultant delays), who is perhaps better equipped to judge what is really necessary to get the tool back to 80 per cent of its original power. In either case, the question arises whether it pays to put 50, 60, or 70 per cent of the original cost of the tool back

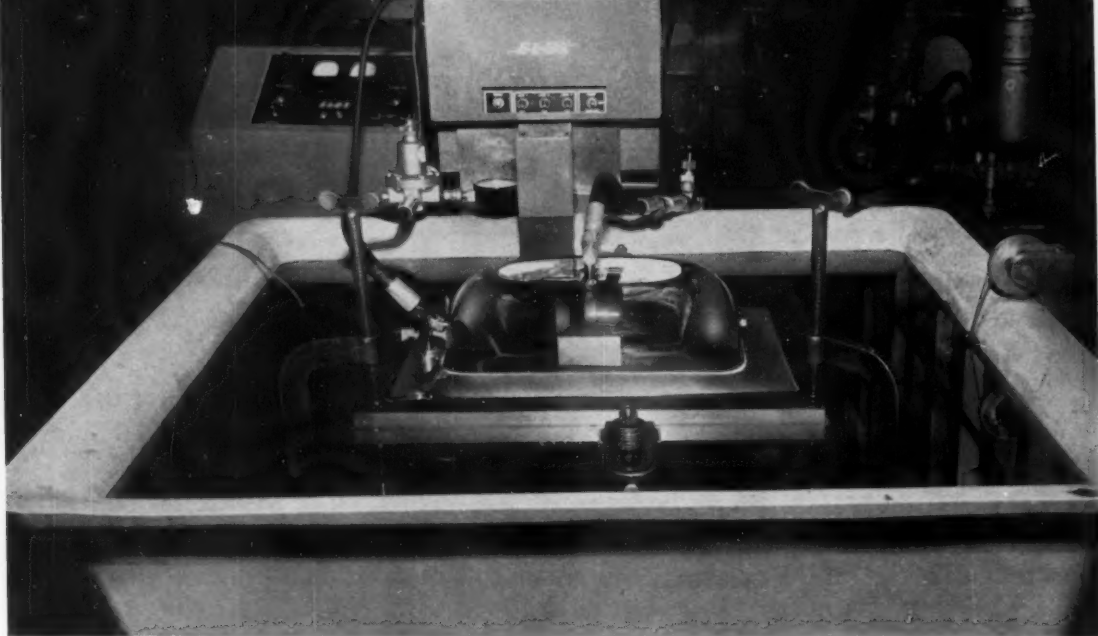
into it. If the tool is five years old it has long since paid for itself, and the manufacturer may have a tool of advanced design that will increase production. In that case, repairs probably should not be carried beyond the 33 per cent point.

Two additional factors to be considered in determining the practicability of making major repairs are the skill of the repairmen and the cost of repair time. These are obviously related. Such jobs as the shrinking of a sleeve into a housing or the alignment of right-angle gears require considerable skill and may be impossible without special tools. The cost of repair time added to the cost of replacement parts is the real repair cost.

An example can be cited. A \$160 tool needs replacement parts totalling 50 per cent of the original cost, or \$80. This figure does not represent 50 per cent of the replacement cost of the parts in the tool. Complete tools naturally cost less than the total price of their component parts when purchased separately.

With regard to labor, a safe assumption is that it will take a repairman four hours to tear down the tool, list the parts to be replaced, get the proper parts, reassemble the tool, and test it. Wages and overhead will amount to at least \$5 an hour, so the cost of repair time will be a minimum of \$20. This figure is added to the part cost to show a total outlay of \$100 to repair a \$160 tool—or over 60 per cent of the original price. The tool now operates at approximately 80 per cent of new-tool power and may be difficult to maintain at this level. Furthermore, the repairman's time might have been more profitably spent on preventive maintenance or on simple replacement procedures. Emphasis is placed on prevention, rather than repair.





## A New Idea in Spark-Machining

**JAMES D. SHOEMAKER, Manufacturing Research Engineer**  
**Lockheed Aircraft Corporation, Burbank, Calif.**

**A**N inverted electrode spindle and a plastic bubble over the work area are features of Lockheed Aircraft's latest spark-machining techniques. Interested in spark-(electrical discharge) machining since the start of the process, the company uses it extensively to finish cavities of impact-extrusion dies. These cavities are relatively large and deep, and after being "roughed out" by conventional machining methods on die-sinking equipment, the dies are hardened and spark-machined.

Basically, the process removes metal by a series of rapid electrical discharges—up to millions per second—between an electrode, which takes the place of a tool, and the work. To create the discharges, voltage is built up between the electrode, which is negative, and the work, which is positive. As this occurs, electrons pile up on the electrode, then speed toward the work. When the electrons strike the work, they transform a tiny portion of the surface into a superheated metallic vapor having a positive charge. Since the electrode is negative, it attracts the vapor to it.

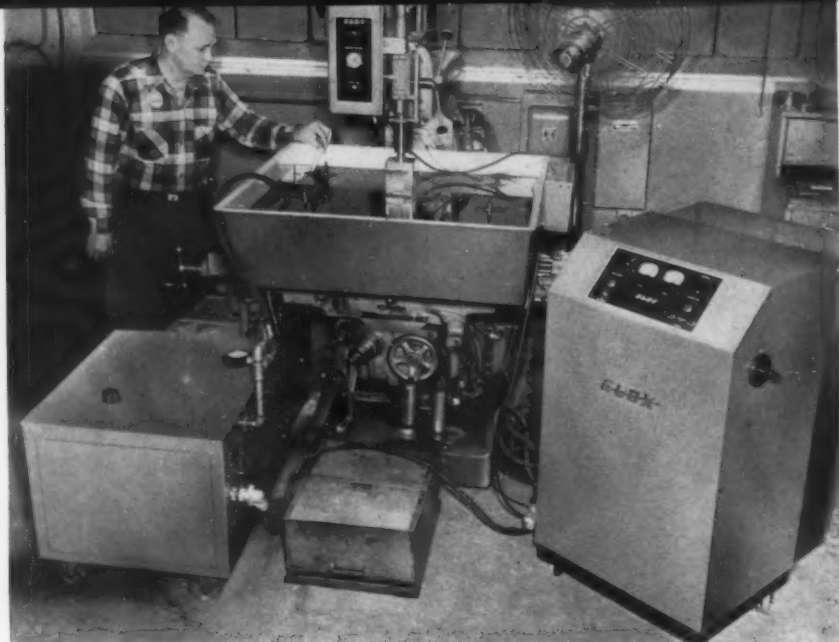
The vapor, however, does not reach the electrode, because of the presence of a dielectric coolant in which the electrode and work are sub-

merged. Instead, the coolant washes the vapor out of the gap between the electrode and work. Intermittently, the power supply is shut off so that only the metal removed is heated, not the entire work. The coolant also serves to build up electrical resistance so that energy stored is at its peak for the arc discharge.

The electrode is made of yellow brass, and in cross-section corresponds to the shape of the desired cavity. To maintain a constant gap between electrode and work—0.0002 to 0.0015 inch, according to surface finish requirement—the electrode is fed to the work by a servomotor. The small size of the gap requires a high degree of rigidity in the electrode spindle.

During the process, the end of the electrode itself is eroded. The amount of this erosion varies according to the kind of work material, the cutting rate, and the size and shape of the work surface. Cavities of the impact-extrusion dies are rough machined by the electrical discharge process to surface finishes of 140 to 150 micro-inches. Smoother finishes of 80 to 90 micro-inches are then easily obtained. A moderate amount of lapping is performed to produce a final finish of 5 to 10 micro-inches. Tolerances of the cavities are

**Fig. 1.** In the original equipment, the electrode spindle was on top, and fed down to the work in the trough.



held within 0.0015 inch, with all sides true to the perpendicular.

In the conventional arrangement of electrical discharge equipment, the work is located in a fiber-glass trough directly beneath the electrode. A servomotor feeds the electrode down at a rate which maintains the proper gap with the work. At Lockheed, the original equipment, which was supplied by Elox, was set up on an old horizontal milling machine as shown in Fig. 1. The trough was mounted on the machine table, and the electrode control-head was mounted on the front of the overarm. The milling machine itself had no function in the operation, serving merely as a unit on which to position the spark-machining elements. Next to the machine can be seen the

power pack and the coolant pump, reservoir, and filtering unit.

The erosion of the electrode produces an undersize condition at its end. Therefore, the total length of the electrode, or sequence of electrodes, used must be made more than the height of the die block and must feed an added distance through the cavity to eliminate any taper in the walls. An important item in the successful operation of the process is the maintenance of correct pressure and volume of the dielectric coolant. Pressure must be strong enough to wash away the particles of metal as fast as they are removed from the work. Depth of coolant in the trough must be sufficient to keep the contact area of the electrode and work completely submerged. Cool-



**Fig. 2.** With the electrode spindle an integral part of the table in the new equipment, greater accuracy is being obtained.



ant flow can be in either direction—through the electrode (if tubular, or prepared with drilled holes) and out the gap; or through the cavity (if previously roughed out) and out the gap. Since most cavities are previously roughed out, the second direction is used more commonly.

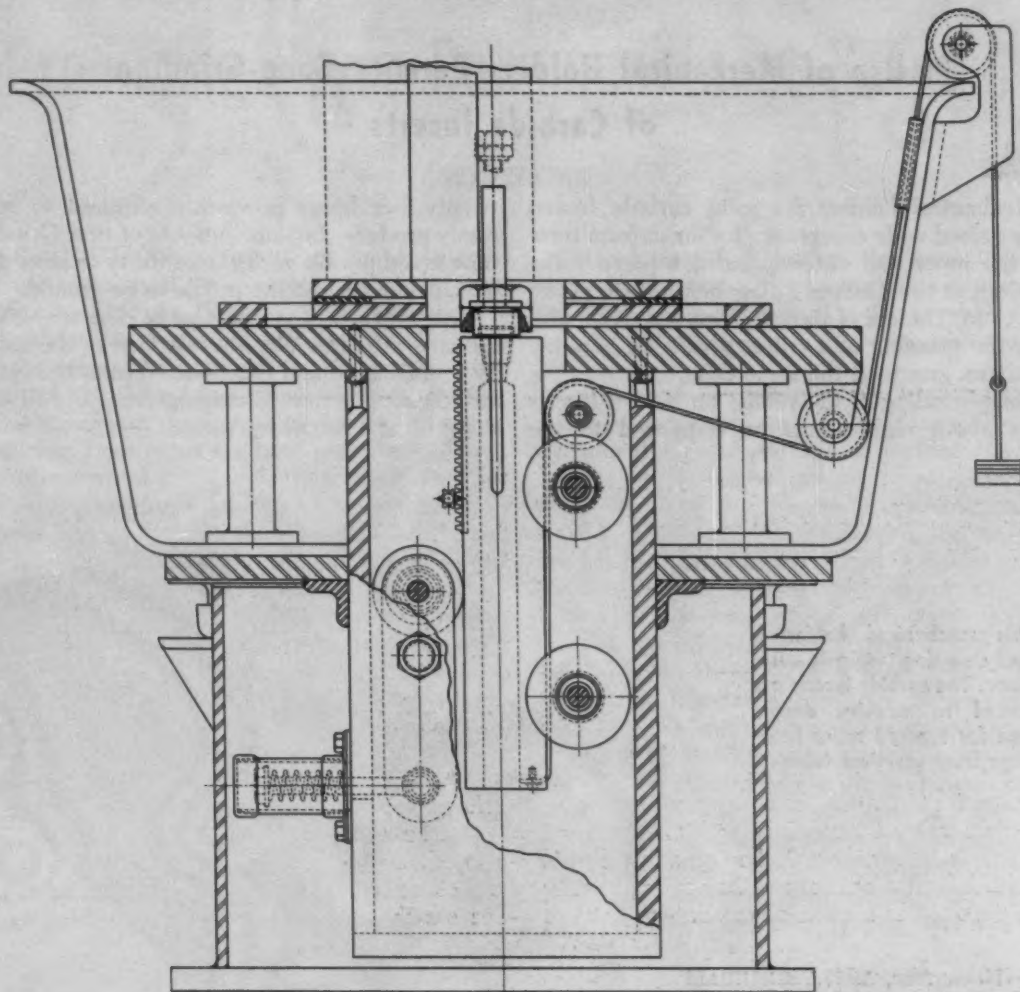
In cross-section, the dimensions of the electrode must be less than those of the cavity, to allow for the gap width. The gap width, in turn, is determined by a number of factors, such as the power unit, the cutting rate, and the surface finish desired. Data on gap widths have been obtained through experimentation, and it is now possible to predetermine accurately the gap width for any set of given factors. Since a gap ordinarily exists completely around the electrode, it is then easy to calculate the electrode's dimensions. For example, if a 0.004-inch gap is predetermined in a rectangular die cavity measuring 2.000 by 3.000

inches, the electrode cross-section would measure 1.992 ( $2.000 - 0.008$ ) by 2.992 ( $3.000 - 0.008$ ) inches.

Lockheed's experience with the initial equipment produced remarkable savings in die-making time. Some troubles still required correction, however. Cavities occasionally showed irregularities such as waviness, excessive taper, or ridges. It was possible to clean these imperfections up by refinishing one wall at a time with a trimmed electrode positioned in the cavity to clear all other walls. But this was time-consuming and tended to defeat the purpose of spark-machining in the first place.

It had been determined that to obtain optimum efficiency from the process, the electrode had to be supported so that it would be unaffected by ambient vibrations or distortions brought on by temperature changes. The spindle

Fig. 3. This cross-section of the table shows how the rollers confine the spindle.



had to be free from play or slack, and rigidly aligned.

An arrangement of the spark-machining components was made, Fig. 2, in which the use of the milling machine as a base was abandoned. A new and bigger trough was provided. Instead of being overhead, the electrode spindle is inverted and is an integral part of the table that supports the trough. After a die-block is positioned in the trough, the spindle is raised through the rough-machined die cavity. Then the electrode is attached to the end of the spindle, and spark-machining is done as the spindle feeds down.

A cross-sectional drawing of the table and trough appears in Fig. 3. By confining the spindle in two vee rollers by means of a third flat pressure roller, all play, slack, and clearance are eliminated, and perfect alignment is assured. Better control of dimensions has been obtained, since it is unnecessary to realign the electrode in the cavity because of thermal expansion and contraction differences. These occurred between the milling machine table and the overarm when the original equipment was used.

The continuous arcing contact between the

electrode and the work without excessive hunting provided by the new setup has effected a 50 per cent reduction of the cutting time needed on the original machine. Another advantage obtained has been the elimination of ridges or rings in the cavities, believed to be caused by excessive hunting of the electrode, variations in power feed control, and previous inability to synchronize coolant flow and direction to cutting rate.

In actual operation, a plastic bubble or vacuum dome is sealed over the work area, as can be seen in the heading illustration. Previous experience showed that when the coolant flowed opposite to the direction of electrode feed, the best finish and fastest machining speeds were obtained. In the milling machine setup, this had been accomplished by mounting the work directly over a pressure trap. Coolant was forced into the trap and out through the arcing gap between the electrode and work.

With the new arrangement, the same result is obtained by using the plastic bubble over the work. Coolant is sucked up through the gap, then discharged and recirculated through a flexible tubing line in the top of the dome.

## Use of Mechanical Holders Permits Gang-Grinding of Carbide Inserts

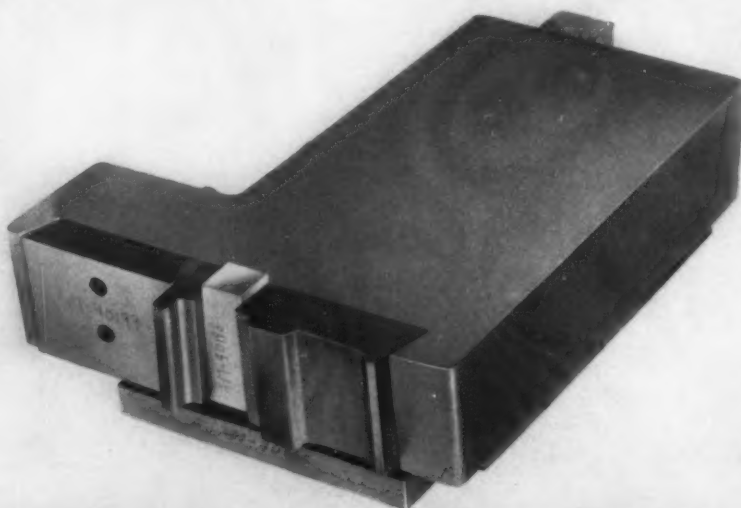
Mechanical holders for solid carbide inserts have gained wide acceptance for finish-form turning the inner and outer races of tapered roller bearings at the Timken Roller Bearing Co., Canton, Ohio. The use of these holders has made possible the grinding of a cutter profile on as many as sixteen inserts at the same time.

Gang-grinding of the profile on sixteen inserts takes about eight hours as compared to the

twenty-four hours previously required to separately produce the same number of tips. Grinding time saved per tip varies from thirty to sixty minutes, depending on the profile to be ground.

Only two sets of mechanical holders are needed for each machine. The insert is held in the holder by a side clamp and is supported from behind by an adjusting screw. Changing from a dull to a sharp bit is a simple operation.

This mechanical holder is used on a single-spindle automatic. The carbide inserts are ground to machine double cups for tapered roller bearings from seamless tubing.





## Producing Dryer Components at Hotpoint

HERBERT CHASE

**P**RODUCTION of dryers for home laundry use is among the major activities of the Hotpoint Co., Chicago, Ill. Two of the more important sheet-metal components being fabricated are the perforated drum in which the clothes are tumbled and the cabinet which houses the drum. Some significant operations performed in manufacturing these items are here presented.

Perforation of 0.037-inch thick sheet steel for the drum cylinder is done in a Clearing press, as can be seen in Fig. 1. Operating at a rate of 182 working strokes a minute, the press is equipped with eighty-six punches arranged in two staggered rows of forty-three. These rows are situated at right-angles to the movement of the stock through the press. Occasional hand lubrication is applied to the punches. Feed is by Littell rolls that provide forty-three automatic indexings per piece, resulting in a total of eighty-six rows of holes.

All the holes are pierced in two large areas that are approximately square. As the feed cycle is automatic, the punches remain idle while areas not to be pierced are moved forward. Uniformity of groupings is maintained from sheet to sheet.

Pierced slugs fall through the press bed and onto a conveyor that discharges them into a scrap box. One man feeds a sheet to the press by hand, then walks around the press to remove the pierced sheet and stack it.

Each sheet is delivered to a second press where it is notched and trimmed, and the door opening is pierced out. Three paddles are then formed by V-shaped inward bends. After the piece is rolled to a generally cylindrical shape (still including the inward bends), the two ends are joined by gun spot-welding. A flange around the door opening is then extruded outward.

End plates are circular stampings that are flanged around both their periphery and a large central hole. These plates are assembled to the perforated cylinder and are gun spot-welded in place. The assembly then is positioned on a fixture of the Maplewood machine shown in the heading illustration where the peripheral flanges are crimped to the cylinder one at a time—the drum being reversed between crimpings.

Wrap-around cylinders for dryer drum enclosures are produced from sheets that are first blanked to size and then pierced and embossed



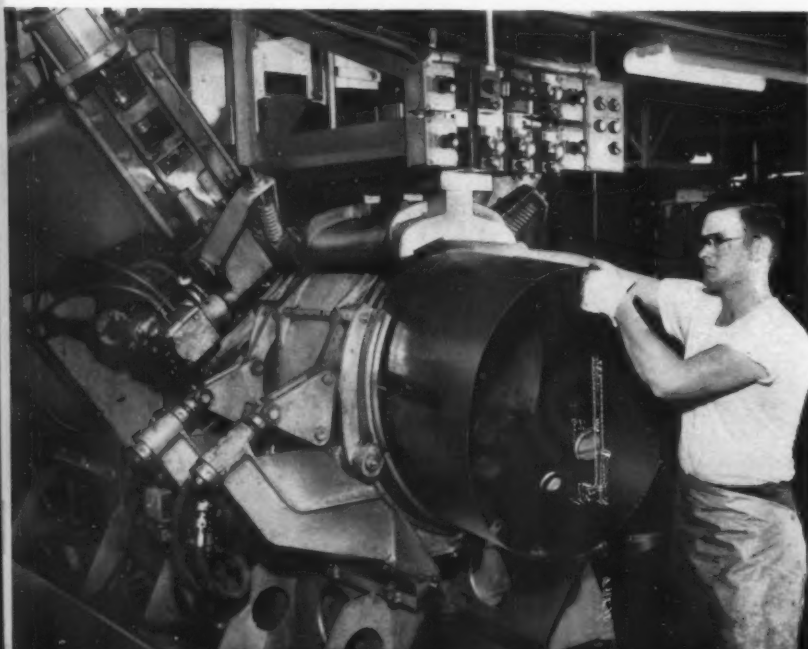
**Fig. 1.** High-speed press operates at the rate of 182 strokes per minute to perforate blanks for drum cylinders. Two rows of forty-three holes are pierced on each down stroke.

in a two-station hydraulic machine. After the sheet is rolled to a cylindrical shape, it is placed in the National seam-welder, Fig. 2, where it is clamped and its ends are joined in a longitudinal seam.

Next, the cylinder is placed in a company-built, double-end flange rolling machine, Fig. 3, which has one fixed and one movable head. After the piece is set over the fixed head to a gaged depth,

the head is expanded to lock the work. The movable head is then inserted and expanded at the correct depth. Sets of rolls at each end then form the metal outward as the cylinder is rotated, thereby producing the two flanges. When the flanges have been completed, both heads are contracted and the cylinder is removed.

Subsequently, the flanged cylinder is brought to the double-head Resistance welder shown in



**Fig. 2.** Welding machine produces a longitudinal seam to join the two ends of a wrap-around cylinder for a dryer drum enclosure. Several forming operations are performed prior to welding.



Fig. 3. Special machine in which the cylindrical wrap-around shown in Fig. 2 is flanged. Two heads enter the cylinder and expand to position and rotate it. Two sets of rolls then turn the flanges outward.

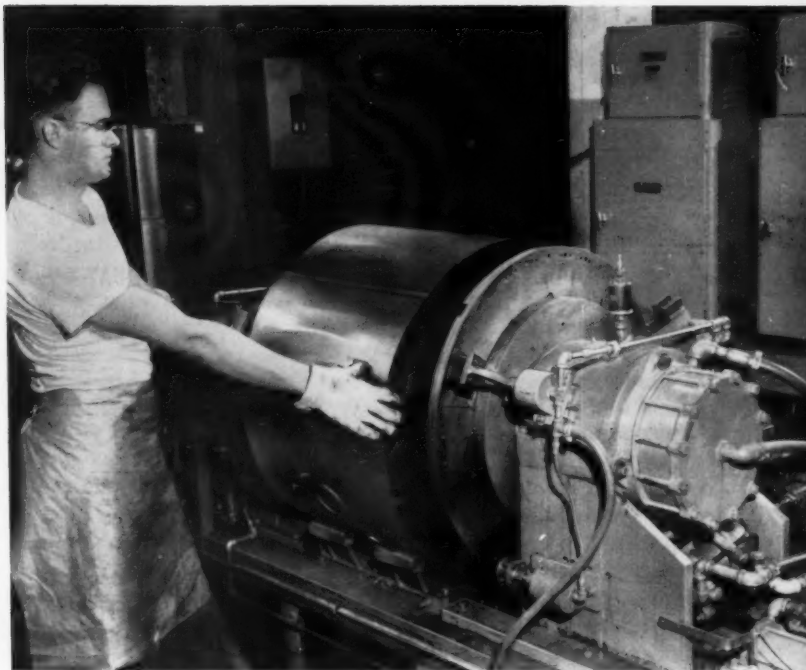


Fig. 4 and is positioned in an upright fixture. A rectangular bulkhead is placed over the cylinder and the welding heads are lowered. As the fixture rotates through an arc of 180 degrees, circular seam welds are produced. These welds fasten the rectangular stamping to the cylinder flange. A second bulkhead is welded to the flange at the opposite end of the cylinder on a similar type of welding machine.

Fig. 4. Each flanged cylinder is placed in the fixture of this machine and a bulkhead stamping is placed over it. When two welding heads are lowered, circular seam welds are made as the work rotates 180 degrees.



#### Aluminum Alloy for Marine and Structural Use

A new high-strength aluminum alloy intended for marine and structural uses has been announced by the Aluminum Co. of America. Designated 5456, the new nonheat-treatable alloy meets Navy needs for strength in aluminum plate for gun mounts, carrier elevators, deckhouses, and other shipboard installations. The alloy can be easily joined by resistance, tungsten-arc, and consumable-electrode welding methods. Tensile strength of welds exceeds the 42,000 psi minimum that is guaranteed for the metal when in the annealed temper.

Ranging in plate thickness from 0.250 to 2 inches, the alloy is produced in O and H321 tempers. Typical mechanical properties of alloy 5456-H321 are a tensile strength of 51,000 psi, a yield strength of 37,000 psi, and an elongation of 16 per cent.

# Two-Way Clamping and Automatic Work-Centering Fixtures

W. M. HALLIDAY  
Southport, England

IT IS often necessary to locate and clamp work-pieces in a jig or fixture by their unfinished external surfaces. Since castings, forgings, or other work having variations in size cannot be readily positioned against fixed stops or gripped by pressure in one direction, alternative methods must be employed. Generally, work-holding arrangements with features such as two-way clamping and automatic centering are required to reduce loading time and minimize the risk of inaccurate settings. Three fixture clamps designed to position and hold rough, unfinished parts are here illustrated.

A fixture clamp designed to hold and locate flat components of a simple geometrical shape, such as a square, a rectangle, or a polygon is illustrated in Fig. 1. The device can also be used on irregular shapes similar to the one shown at A. This work-piece is a brass casting machined on top and bottom surfaces but having all outside edges left in the as-cast condition. Gripping pressure is applied on the two long, stepped sides to center it in the fixture—regardless of the roughness of these edges and the variations in width of individual castings.

The fixture consists of a hardened steel baseplate *B* which has the top and bottom surfaces ground flat and parallel. A drilled hole is located near each corner for the hold-down bolts used to secure the fixture to the machine table. The work-piece is positioned in the correct longitudinal position by the fixed stop *C* which is attached to the top of the baseplate by screws. In the transverse direction the work is centered and gripped for light machining by a pantographic lever system.

Lever *D* pivots on headed stud *E* which is threaded into the top of the baseplate. This stud is centered exactly along the length of the lever. Each end of lever *D* is slotted to receive the ends of the longer links *F* and *G*. These links pivot on pins *H*, which in turn are secured in lever *D*. Members *F* and *G* are identical in size and shape, and are located parallel to the long sides of the work-piece as shown.

Lever *J* is identical to lever *D* and is mounted centrally lengthwise on the headed stud *K*. Lever *J* is connected to link *G* by pin *L* and is straddled at the opposite end by shackle *M*. Link *F* and lever *J* are both pivoted on a headed stud *N* that is secured in one side of the shackle. All levers and links, the shackle, and the pivot pins are casehardened for maximum durability. The entire pantographic linkage swivels about the two stationary fulcrums *E* and *K*, and links *F* and *G* are always parallel with each other. Further, these members will always be an equal distance from a plane passing through the center of fulcrums *E* and *K*.

A threaded shank integral with the shackle *M* passes through an elongated hole in block *O*. This block is affixed by two screws to a slight recess milled into the top of the baseplate. A knurled thumb-nut *P* threads over the shank to the right of the block, and a hardened and ground steel thrust washer *Q* is placed between the nut and the block to reduce sliding friction. Coil spring *R*, which is positioned on the shank of shackle *M* to the left of the block, moves the shackle to the left when nut *P* is loosened. Collar *S* is pinned to the end of the shank to retain the thumb-nut.

The work-piece is gripped and located by four headless screws *T*, two of which are secured in each of the links *F* and *G* by nuts *U*. The rounded and hardened ends of these screws bear against the stepped sides of the work as shown. Each screw of an opposed pair is adjusted to project the same distance beyond the inner side of its respective link in order to center the work.

To load a work-piece into the fixture, nut *P* is first loosened a few turns. This action allows spring *R* to force the shackle to the left and swings the lever system counterclockwise about fulcrums *E* and *K*. Links *F* and *G* are moved slightly wider apart, so that the work-piece can be admitted easily between screws *T*.

The component is held against the stop *C*, and thumb-nut *P* is readjusted to draw the shackle toward the right. This causes the lever system to

swivel clockwise. Links *F* and *G* approach each other with the same amount of travel, thereby centering the work-piece on the fixture. Final tightening of the thumb-nut imparts the necessary gripping pressure on the work.

This clamping mechanism is capable of accommodating components which vary considerably in over-all width. Parts of irregular shape can be readily centered and gripped by adjusting screws *T*, which may project variable distances beyond the links. Extremely irregular parts may be handled by providing a greater number of such screws. Only moderate gripping pressure, suitable for light duty, can be obtained with the thumb-nut. Pressure on the work may be increased, however, by replacing the thumb-nut with a light-alloy handwheel.

Another type of work-centering fixture clamp is illustrated in Fig. 2. This design operates on a different principle and is particularly well suited for use with long components that have to be gripped over their length. The clamp automatically centers work-pieces relative to some datum line on the fixture, regardless of variations in part length.

The square baseplate *A* of this fixture is ground on both top and bottom, and each corner is drilled for bolt holes. A stop *B* is permanently affixed to the top of the base at its left-hand side. In this particular case the work-pieces *C* have to be centered exactly with the axis *X-X*. Stop *B* is therefore set perpendicular to, and central with, that axis.

Hardened steel block *D* is tongued on the underside and is a sliding fit within the narrow upper portion of a T-slot machined in the base-

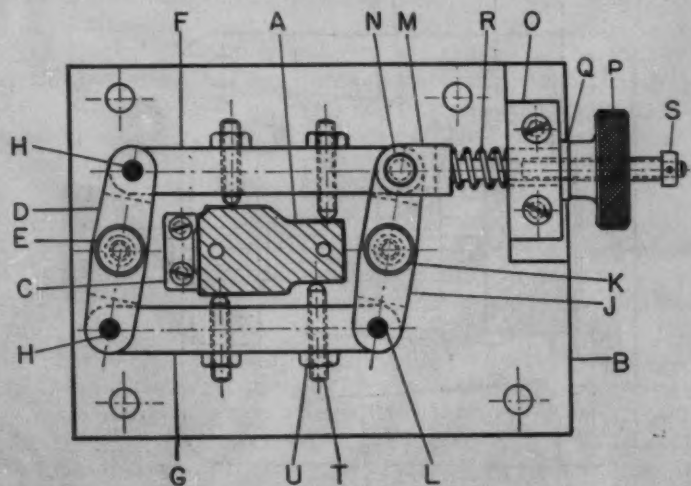
plate. The wider section of the slot is in the underside of the base as indicated by the light broken lines. The T-slot is centered on the axis *X-X* and extends from the right-hand side of the base to a point slightly beyond the right-hand side of a work-piece in the clamped position. A keeper (not shown) is fastened to the base of the block and is situated within the wide portion of the slot to retain the slider.

The upper portion of the slider-block is drilled and tapped for a pressure-screw *E*. This screw is supported within a hole in the stationary bearing block *F* which is secured to the top of the base-plate by two cap-screws *G*. The shank of screw *E* has a large integral collar that is situated to the left of block *F*. Adjusting nut *H* is affixed by a cross-pin to the end of the shank that projects to the right of the bearing block. The adjusting nut has a boss to permit the knurled portion to extend beyond the baseplate for clearance purposes.

Nut *H* is fastened to the screw in a position that allows it a 1/8-inch movement in the bearing block. The end of the screw that bears against the work-piece is rounded and hardened. In position, the pressure-screw is parallel to and somewhat above the top of the baseplate. This allows the pressure to be applied at a point about midway in the height of the work.

The work is gripped and centralized relative to an axis *X-X* by means of the two fingers *J*. These hardened steel members are identical in shape and size. Each finger has slightly rounded projections on the inner end for contacting the work-piece, and at the other end is pivoted on a headed stud *K* which is secured into the top of

Fig. 1. Pantographic clamping arrangement that can be adjusted to center work-pieces in the fixture. Components are gripped across parallel surfaces.



the baseplate. The studs are located at equal distances from either side of the axis X-X, and the same distance from the stop. The fingers are slightly less in height than the work-piece and are supported by the baseplate.

A short link *L* couples each finger directly to the slider-block. These hardened steel links are identical in size and shape, and each pivots on a pin *M* secured in one of the fingers. Pins *M* are located at the same distance from the center of studs *K*. The opposite end of each link is pivoted on a similar size pin *N* within a slot in the adjacent side of block *D*.

To load a work-piece into the fixture, fingers *J* are first expanded by turning nut *H* and screw *E* in a counterclockwise direction. This action moves the screw to the right until the collar bears against the left-hand side of the fixed block *F*. Further turning of the screw then draws slider *D* toward the left. This action causes fingers *J* to swing outward the same distance on each side of axis X-X, until links *L* are perpendicular to the pressure-screw and are in their maximum expanded position.

Work-piece *C* is then placed on the baseplate between the fingers with the proper side bearing against stop *B*. Nut *H* and screw *E* are rotated clockwise, closing the fingers and thus centering and gripping the work. The first few turns applied to the screw cause it to slide through bearing block *F*, a distance somewhat less than the clearance provided. This movement brings the rounded end of the screw into contact with the work and holds it against stop *B*. Further rotation

causes block *D* to move away from the work. Such motion closes fingers *J* until they grip their respective ends of the work. When this occurs the work-piece will have been centered correctly relative to axis X-X. A final half turn on the screw serves to impart a grip on the work-piece sufficient to hold it for light-duty machining such as drilling, finish-milling, or grinding.

The clamps illustrated in Figs. 1 and 2 leave the top surface of the work-piece completely exposed and fully accessible to cutting tools. In addition, the position of the work-piece on these fixtures facilitates loading, unloading, and cleaning operations.

A fixture having a two-way clamping action is illustrated in Fig. 3. With this arrangement the work-piece is clamped on its top surface and on one side face.

The fixture consists of a cast-iron body *A* fastened permanently on top of the parallel baseplate *B*. Holes are provided in the projecting ends of the baseplate for the usual hold-down bolts. Clamping arm *C* is of casehardened steel and is fitted within a slot in the upper end of an upright projection on the left-hand side of the body. The arm pivots on a pin *D* which is secured in one side of the slot. For opening the fixture, arm *C* is permitted to swivel more than 90 degrees—the open position being determined by the square corner on the arm striking against the bottom of the slot. This occurs when the arm has swung upward and slightly past the vertical position.

A pressure-pad *E* is fitted into a slot cut through the arm and is pivoted on a cross-pin *F*. The lower

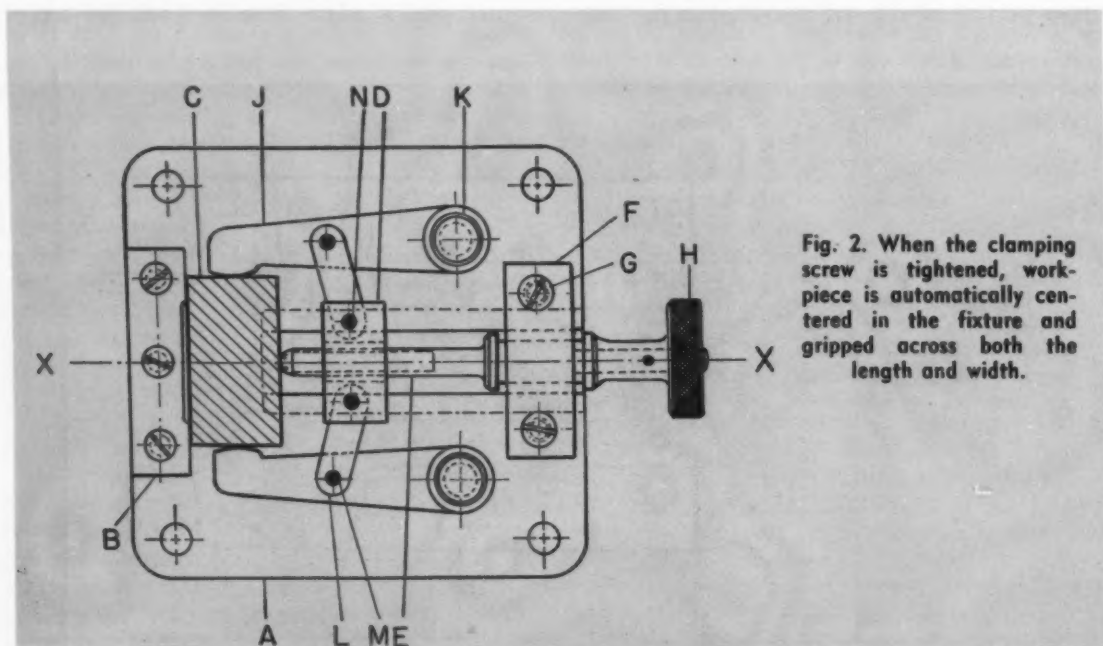
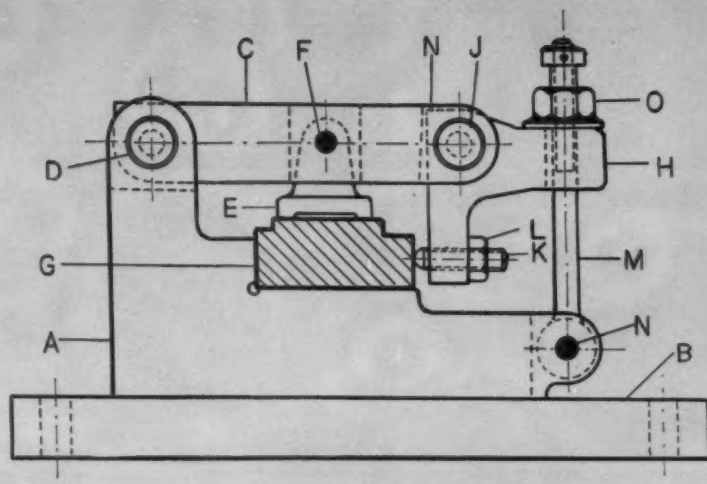


Fig. 2. When the clamping screw is tightened, work-piece is automatically centered in the fixture and gripped across both the length and width.



**Fig. 3.** The work-piece is clamped in two directions with this fixture. It can be adapted to hold other components in a range of widths and heights.



rectangular end of the pressure-pad bears on top of the work *G*, and the slight swivelling action enables the pad to align with the rough-cast top surfaces of the work.

The right-hand end of the arm *C* is slotted to receive the L-shaped bracket *H*. This member is pivoted on pin *J* which is fastened in the walls of the slot. The small, swivelling movement of the bracket is limited by the square corner of the member bearing against the base of the slot. The lower (vertical) leg of the bracket is drilled and tapped for the hardened screw *K*. This screw is rounded at the tip for bearing against the front of the work and can be adjusted within the bracket to suit different widths. Nut *L* retains the screw in any required setting.

An eye-bolt *M* is located within a slotted boss on the lower right-hand side of the body *A* and is pivoted on a fixed cross-pin *N*. The threaded end of the eye-bolt is free to enter an open slot in the end of the horizontal leg of bracket *H*. Clamping pressure is applied by the hexagonal collar-nut *O*. This hardened-steel nut is threaded on the bolt so as to bear on the top side of the bracket. A collar is pinned to the end of the bolt to prevent the nut from being removed.

When loading a work-piece into this fixture, nut *O* is slackened to enable the ring bolt *M* to swing out of the slotted end of the bracket *H*. Arm *C* and the bracket are then raised into the open position with the square corner resting on the base of the column slot. The work-piece is placed on the fixture in contact with the vertical step. Next, arm *C* is lowered into the closed, horizontal position with pad *E* resting on top of the work. Bolt *M* is then swung upward into the slotted end of the bracket. As nut *O* is tightened, the bracket is first pivoted clockwise causing screw

*K* to press the work-piece against the vertical step in the body. Further tightening of the nut serves to force arm *C* down so that the pressure-pad clamps the work to the fixture. Various heights of work-pieces can be accommodated by employing a set of interchangeable pressure-pads, each being of a different length. Set-screw *K* may be adjusted to accommodate work-pieces of slightly different widths.

\* \* \*

### Martin Receives Award for Development of Bonded Structures

For the first time in almost a quarter of a century a company, rather than an individual, was the recipient of the John Price Wetherill Medal of the Franklin Institute, Philadelphia, Pa. The award was presented to the Martin Co., Baltimore, Md., in recognition of the intensive research, development, and manufacture of bonded structures. Used by many manufacturers engaged in airplane construction, bonded structures withstand higher stresses, provide more uniform stress distribution, and reduce fatigue stresses.

In Martin's system of bonded structures, the low-density core is a honeycomb formed by joining corrugated aluminum, or other metal, with an adhesive to form hexagonal cells. The same adhesive is used to join the metal skins to the core. Known as FM-47, the adhesive is used both as a liquid and as a prepared film supported on an open-weave glass cloth with threads 0.1 inch apart. After application of the adhesive to the metal, the bond is made by preheating to 300 degrees F. followed by curing for thirty minutes at this same temperature, under pressure.

A. W. JOHNSON  
Manufacturing Manager  
Caterpillar Tractor Co.  
Decatur, Ill.



## Heavy-Duty Bending is a Familiar Sight at Caterpillar Plant

A MODERN plant of the Caterpillar Tractor Co. at Decatur, Ill., features a straight-line production system for the manufacture and assembly of motor graders and other earth-moving equipment. One of the more interesting operations being performed at the plant is the cold-

bending of steel plates to form blade beams such as those shown in the welding department in the heading illustration. The unusual aspect of this is that the plates are bent edgewise around an axis perpendicular to the broad face of the parts. These members eventually become a part of the annular weldment, Fig. 1, that supports the blade beneath a Caterpillar Motor Grader.

Blade beams shown start out as hot-rolled steel work-pieces 1 1/4 inches thick by 5 1/2 inches wide. The material conforms to the company's own specification that is similar to SAE 1020. Forming of these steel plates is done on a Model 4 Pines bender. To form a 10 1/4-inch radius bend, the straight blade beam is first positioned on the bender against form die A, Fig. 2, and material guide D, Fig. 3. When the operator presses the forward button on the control stand, the machine automatically clamps the work, bends it to a pre-set angle, then unclamps it.

Both clamp die B and pressure die C are de-



Fig. 1. Annular beam weldment used on a motor grader. Two blade beams undergo heavy-duty bending operations for each of these sub-assemblies.

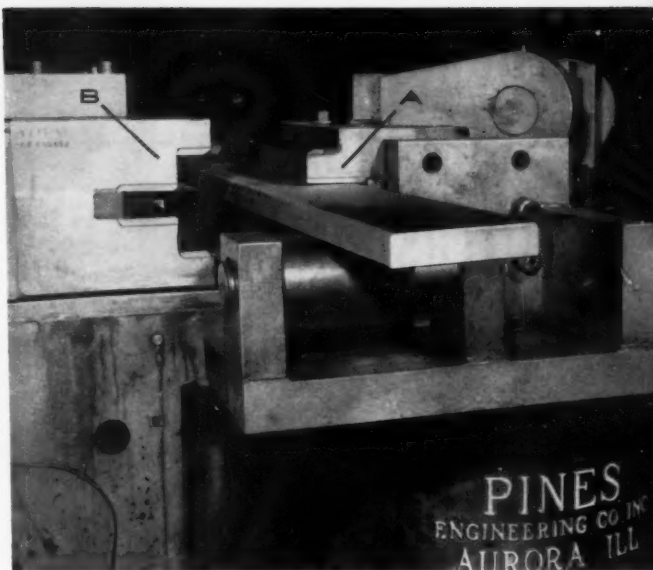
Fig. 2. Steel plate, 1 1/4 inches thick and 5 1/2 inches wide, is placed on a bending machine. Form die (A) and clamp die (B) will securely lock the work at the beginning of the bending cycle.

signed to overlap an extension on form die A, thereby accomplishing two purposes. First, the clamp die and the form die combine to provide both vertical and horizontal clamping pressure against the work-piece. Second, the pressure die combines with the form die to confine the work-piece vertically as it is being bent, thus limiting the amount of thickness growth.

Compression stresses are set up along the inside curve of the work-piece while it is being formed. These stresses would cause the work-piece to thicken considerably on the inside of the bend if the tools were not designed to confine it as shown. It can be noted that form die A is constructed in two pieces with the top piece hinged. When the machine unclamps, the top piece releases all vertical pressure from the work so that it can be removed easily.

For increased tool life, hardened wear-strips are located on the surfaces of the clamp die and the pressure die that grip the work-piece, and also on the surfaces that override each other on the clamp die, pressure die, and form die. The material guide D holds the work-piece in position before the bending cycle is started and also keeps the work-piece from twisting during the bending operation. A steel roller mounted on the swinging arm in front of the clamp and form dies greatly facilitates loading.

Approximately 1 1/2 hours are required to set up the bending machine when a lot is to be run off. A bend accuracy of plus or minus 1/16 inch is specified. Results have been far better than originally expected, judging from previous experience with hot-forming methods used on bulldozer parts. With the bending techniques now



used, spring-back is easily compensated for by degree-of-bend settings on the machine.

In another setup on the bender, a 30 1/8-inch inside radius bend is made in the flat side of the blade beam as can be seen in the heading illustration. In addition to the blade beams, a fender brace is formed by bending 2 1/2-inch diameter steel tubing (0.187-inch wall thickness) to a 6-inch radius by using an appropriate set of tools on the same machine.

As shown in Fig. 1, two blade beams are used in each annular weldment. The blade beams are welded to a 62 3/4-inch diameter mounting ring with a 3/8-inch fillet weld on the bottom and a 5/16-inch fillet weld on the top. Because of their rigidity, any distortion or inaccuracy of the beams beyond permissible tolerances will cause difficulties in locating and clamping the components together in the welding fixture.

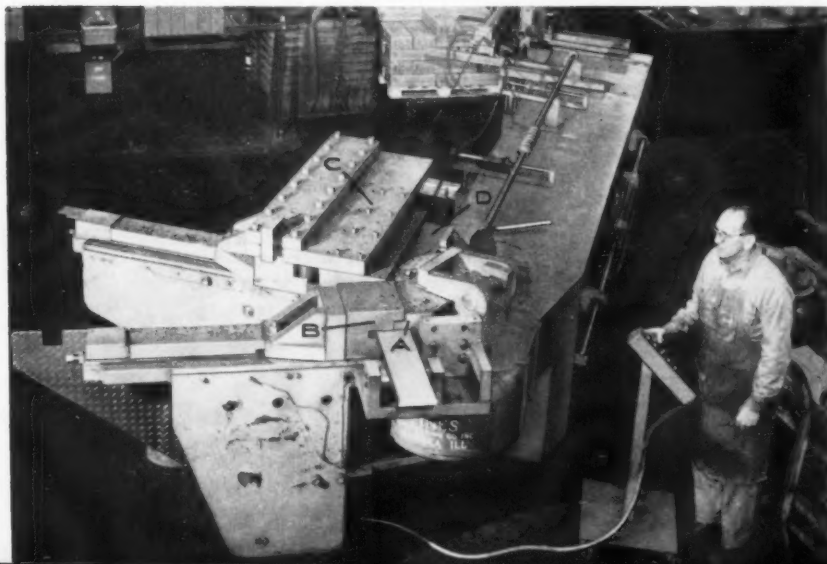
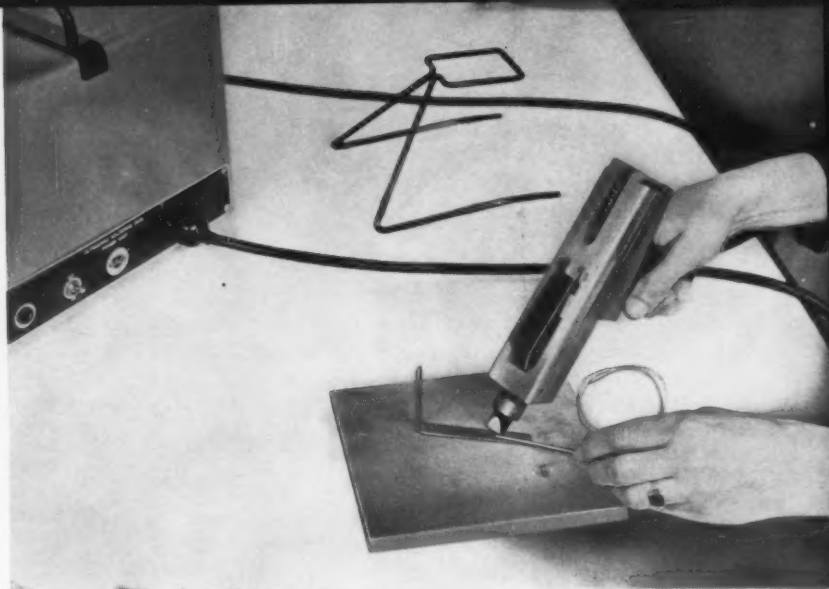


Fig. 3. Edgewise 10 1/4-inch radius bend is being made on a wide steel plate on this hydraulic bending machine. Pressure die (C) retains the stationary end of the work while material guide (D) prevents it from twisting.

# Aluminum Soldered Ultrasonically

LEO WALTER  
Eastcombe, England



The difficulty in soldering aluminum and its alloys is being overcome with ultrasonics. In any soldering operation, the film of metallic oxide on the work must first be removed if a good joint is to be obtained. However, the ordinary flux used for this purpose, which is satisfactory for many metals, proves ineffective with aluminum.

Now, ultrasonic equipment—in the form of a power unit and gun for soldering, or power unit and bath for tinning—entirely dispenses with the need for a chemical flux. Power is applied to the work surface through the molten solder. The effect of the ultrasonic vibrations is to produce imploding bubbles within the solder. This cavitation completely removes the oxide film.

Use of the equipment, made by Mullard, is illustrated in Figs. 1 and 2. The pistol-grip iron, Fig. 1, has a copper bit heated by a low-resistance winding, connected by cables to the

power unit. Within the iron there is a laminated magnetostriction element, controlled by the trigger, which imparts the ultrasonic vibrations to the bit. No flux is required, and the solder used is 90 per cent tin, 10 per cent zinc.

Small aluminum items, such as light wire parts, are first tinned ultrasonically, then soldered in the usual way. For the tinning, the iron is replaced by a bath, consisting of a small solder pot supported on a tripod, as in Fig. 2. The ultrasonic vibrations are applied to the bottom of the pot. Tinning takes but two or three seconds, with the molten solder at a temperature of about 446 degrees F. The only restriction on the soldering afterward is that no chemically active flux be used. In this instance the tinning solder contains 90 percent tin and 10 per cent zinc. Subsequently a 60 per cent tin, 40 per cent lead resin-core solder is used.



Fig. 1. (Above) The soldering iron has a heating element around the tip and a transducer in the body.

Fig. 2. (Left) Tinning the terminals of aluminum wire coils in the plant of an electronics manufacturer.



# PAINT THICKNESS...A Critical Airplane Dimension

NORMAN R. KEEGAN

Chemical-Physical Engineer, Quality Division Laboratory  
The Martin Co., Baltimore, Md.

**T**HE paint finish on a high-speed airplane must, in addition to being smooth, be of unusually uniform thickness. If the thickness varies as little as 0.001 inch, film failure in the form of cracking and "alligatoring" is possible. This, in turn, may slow down the airplane as much as 50 miles per hour and require an added 100 yards on the take-off.

Accurate measurement of paint thickness thus becomes mandatory. Tolerances set up by the United States Navy vary with the type of finish and for some are as little as 0.0001 inch.

The simplest method of measuring thickness is to measure the thickness of the bare metal with a micrometer, then measure it again after it has been painted. The obvious disadvantage is that such measurements are limited to an area near the edge of the material, and they cannot be made on an assembled airplane. Another method employs a device which forces a needle through the paint to the base metal and registers the depth of penetration on a gage. Its drawbacks: frequent recalibration and needle changings are needed; it is tedious; and it is destructive.

A third method, probably the most widely used, utilizes a portable electronic device which produces an oscillating tone when a probe is held against the test surface. The tone is heard through earphones and is balanced out to the vanishing point by using a potentiometer to control a bridging circuit. Then the potentiometer setting is read

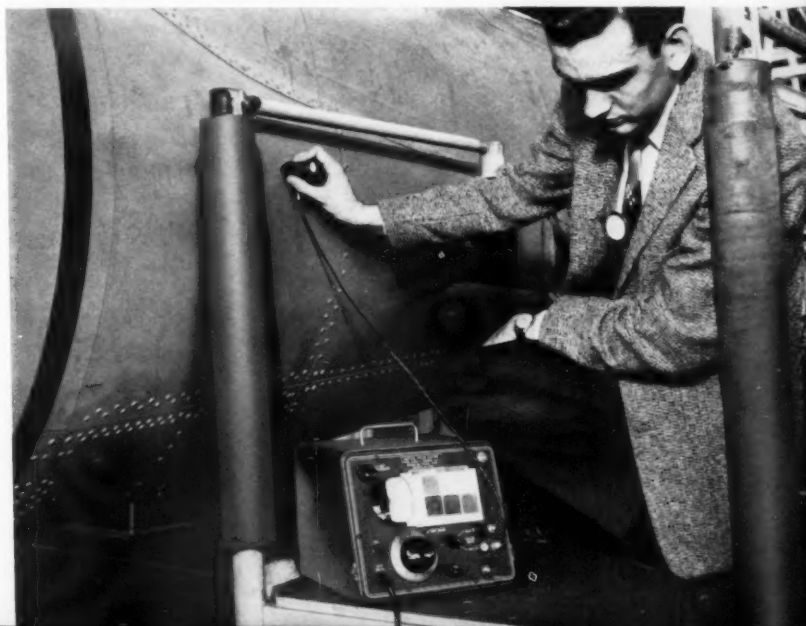
and applied to a graph from which the paint thickness is obtained. The disadvantages of this device are the human error introduced through the ear and the need to adjust the graph whenever the device is recalibrated.

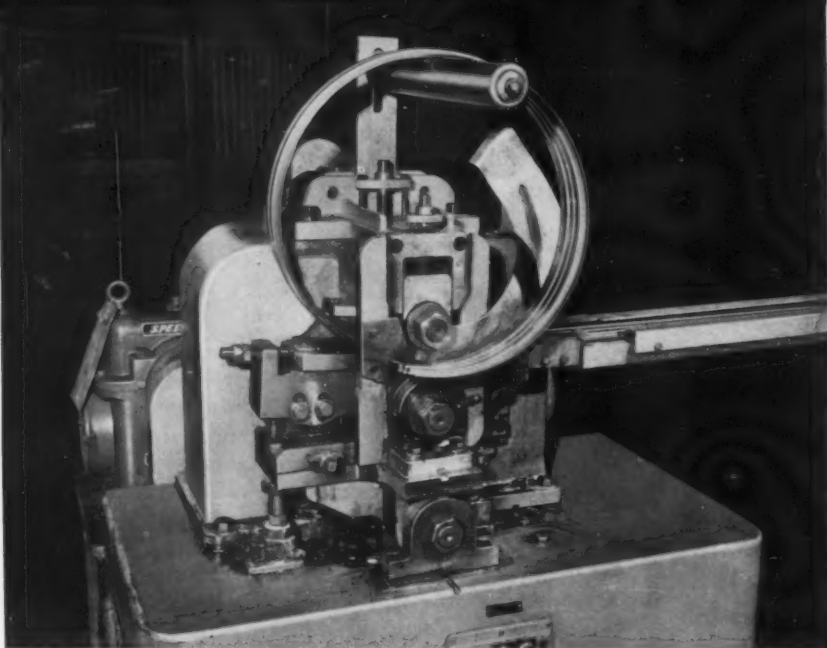
Engineers in Martin Co.'s Quality Division Laboratory recently modified a Boonton film gage to measure paint thickness more accurately and with fewer disadvantages than any of the other three methods. This instrument, originally developed to measure the thickness of metallic plating, was modified and recalibrated to measure the thickness of an organic film. It consists of a probe, indicating meter and control, and a set of sample cards. The probe, which has three feet that rest against the surface being measured, is an induction coil which sets up an electrical field.

When a conductor with an organic finish is brought into the electrical field, eddy currents circulate through the conductor. These currents generate an electromagnetic field which induces an electromotive force in the coil. This opposes the original current and changes its impedance. The change excites a needle in the meter.

The meter is first zeroed with the probe resting on a sample card of an alloy similar to that under test. Calibrations of the meter give thickness of the paint in thousandths of an inch. The Boonton gage can be used on any non-ferrous metal surface where there are no sharp irregularities in the contour, and it is non-destructive.

Measuring paint thickness on an airplane skin with a Boonton gage. Meter is first zeroed with sample card of skin alloy.





*"Flying" Punch Press Teams Up With "Flying" Shear*

## Piercing Introduced in Roll-Milling Line

**E**FFICIENCY in cooling an internal combustion engine is increased by enclosing the fan in a shroud. If the shroud lacks adequate stiffness, a pulsating or drumming sound may be set up and quiet operation is not obtained. This has led to a new method of producing the shroud in the Buick sheet-metal plant.

Drawings call for a circular fan shroud with three channels in its cross-section. Walls of the channels are perpendicular. These channels are integral and give the necessary degree of stiffness,

even though the metal is only 0.0345 inch thick. The part is roll-milled from coil stock 6 7/16 inches wide, then formed to a circular shape and the ends are welded together.

To provide tabs on one end of each length for the welding, a piercing operation is incorporated in the line. This is done by running the stock through a "flying" punch press on its way from the coil cradle to the mill, as can be seen in Fig. 1. Four punches, operating in unison, pierce a row of oblong holes across the strip. These holes ap-

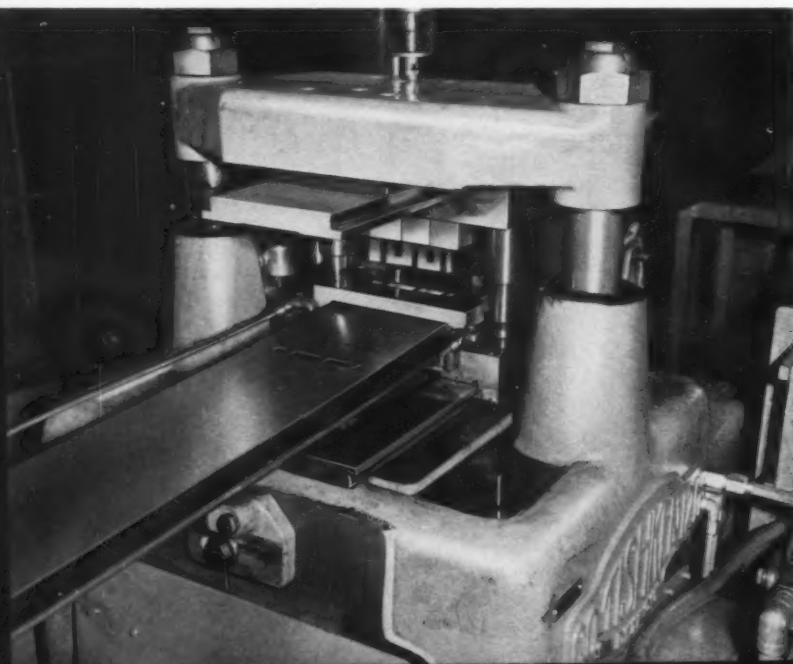


Fig. 1. A slot row has just been pierced in the strip, and the punches and die-blocks are retracted on their slides.

**Fig. 2. The fourteen roll stands of the mill develop the integral stiffeners of the shroud section.**

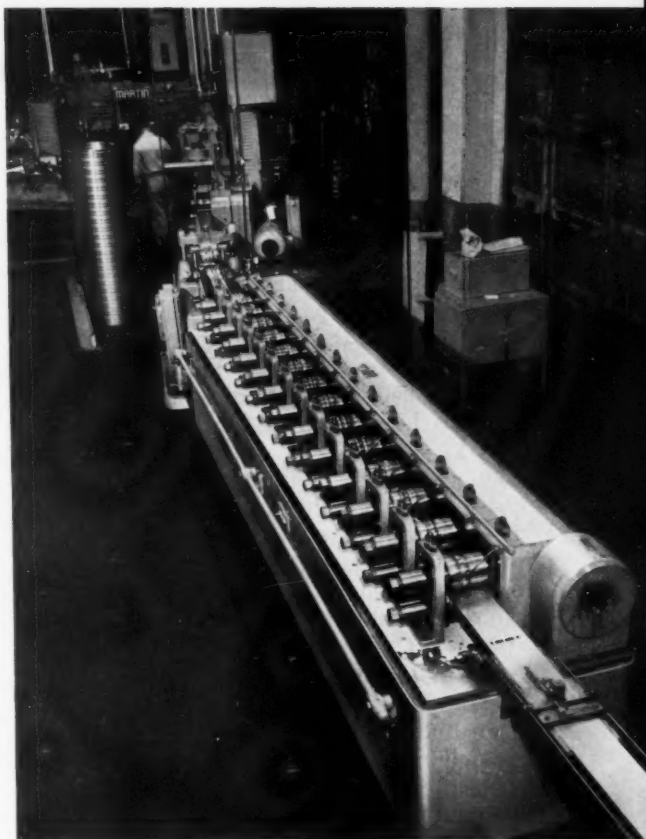
pear in the channel areas subsequently developed in the strip. The piercing also assists the cut-off because of the perpendicular channel walls.

Slot rows are pierced at center distances equal to the circumference of the shroud. Later, when the strip emerges from the mill, the cut-off device—a "flying" shear—operates across each row. In this way, the only metal that has to be cut off is the flat, undeveloped part remaining in the strip cross-section.

As each row is pierced, it is used to locate the point in the strip where the next row is to be pierced. Provision for this can be seen in the foreground of the view of the mill, Fig. 2. In approaching the mill, the strip moves over an extension table on which is mounted a sliding block. Pilots carried on the bottom of the block drop into the slot row as the strip advances. Tie-rods, one on each side of the block, run from the block to the die set in the punch press (Fig. 1).

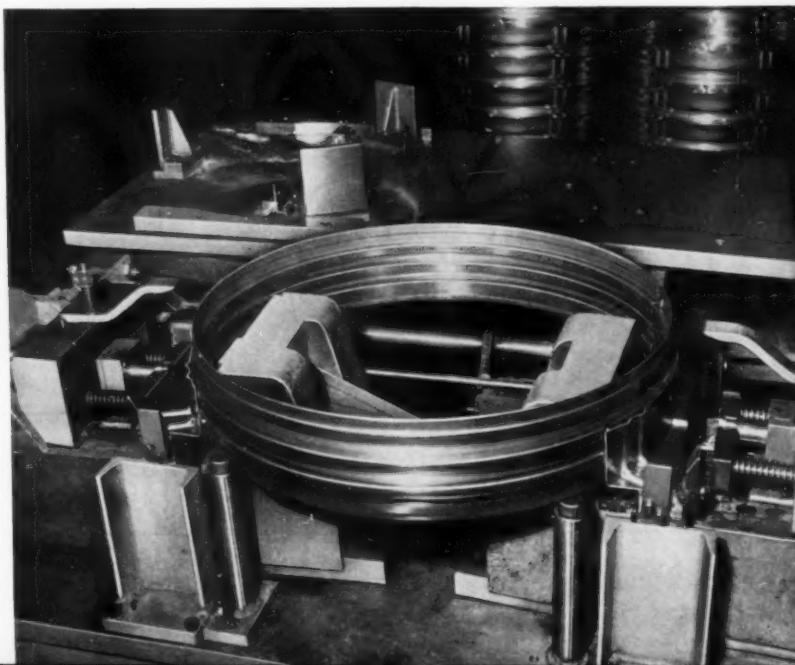
There, the punches and die-block are advanced on slides at the same speed as the strip and at an interval controlled by the tie-rods, until a cam in the press causes the punch to pierce the hole. Then automatically, the pilots are lifted from the preceding slot row and the punch and die-block are rapidly retracted on their slides.

To develop the channels in the strip, the mill, built by Tishken, contains fourteen roll stands. Lengths are cut off by the flying shear and continue their forward motion along a track to a roll forming machine, shown in the heading illustration, where the circular shape is produced.



The ends of the shroud are then butted together and spot-welded in the tab areas. Next, mounting brackets are spot-welded at two diametrically opposite points. Finally, a hole is pierced through the shroud at the location of each of the brackets. This operation, Fig. 3, is performed in a Mid-West Hydro-Pierce machine.

**Fig. 3. Hydraulically operated punches pierce holes through the welded assembly. Checking fixture can be seen in background.**



# Design of Relieved Locator Pins

F. MURRAY, Chicago, Ill.

WORK-PIECES having two or more accurately machined holes are often positioned in fixtures on a pair of locator pins. Generally, to permit alignment of parts having small but allowable variations in the distance between the centers of these holes, one pin is relieved as illustrated in Fig. 1. Tolerance on the hole center distance determines how much of the pin periphery is removed.

Commercial or standard pins are usually relieved so that the width of the remaining lands  $W$  is one-third of the pin diameter. When a pin so designed is used for parts having a relatively large tolerance on the hole center distance, there is likely to be interference between the edge of the pin at  $E$  and the hole. This is especially true if the clearance  $\overline{AC-EC}$  between the pin and the hole is small.

If the interference is slight, it can often be eliminated by stoning a small radius along the edges of the lands. In cases where a greater reduction in the width of the lands becomes necessary, a larger radius  $G$  can be ground on the pin. Reduced land with  $W'$  and the modifying radius are shown on one side of the pin in Fig. 1. Pin diameter  $D$  and land width to suit specified tol-

erances can be readily calculated by the application of formulas derived as follows:

Referring to Fig. 1,

$x = 1/2$  of the land width  $W$ ;  
 $y = 1/2$  of the tolerance distance between the centers of the holes;  
 $r =$  radius of minimum hole in part;  
 $R =$  radius of locator pin.

Side  $\overline{BC}$  is common to two right triangles  $ABC$  and  $EBC$ . In triangle  $ABC$ ,

$$\overline{BC}^2 = \overline{AC}^2 - \overline{AB}^2 = r^2 - (x + y)^2$$

$$\overline{BC}^2 = r^2 - x^2 - 2xy - y^2$$

and in triangle  $EBC$ ,

$$\overline{BC}^2 = \overline{EC}^2 - \overline{EB}^2 = R^2 - x^2$$

Therefore

$$R^2 - x^2 = r^2 - x^2 - 2xy - y^2$$

and, by eliminating  $x^2$  and transposing terms,

$$-2xy = R^2 - r^2 + y^2$$

After dividing both sides by  $-2y$ ,

$$x = \frac{r^2 - R^2 - y^2}{2y}$$

The radius of the locator pin  $R$  is obtained by rearranging terms in the equation

$$-2xy = R^2 - r^2 + y^2$$

and taking the square root of both sides,

$$R = \sqrt{r^2 - 2xy - y^2}$$

Fig. 1. Top view of a diamond type relieved locator pin. Width of land is determined by the tolerance on the distance between the centers of the two locating holes.

Fig. 2. Oval type relieved locator pins are used in small-diameter holes for maximum pin strength. Pins with very small lands should be made in this way.

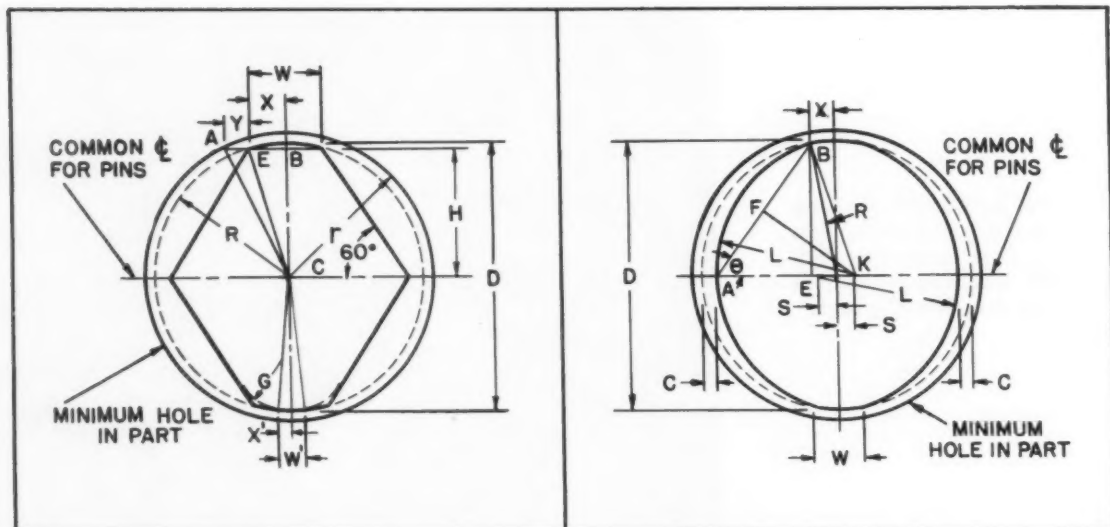
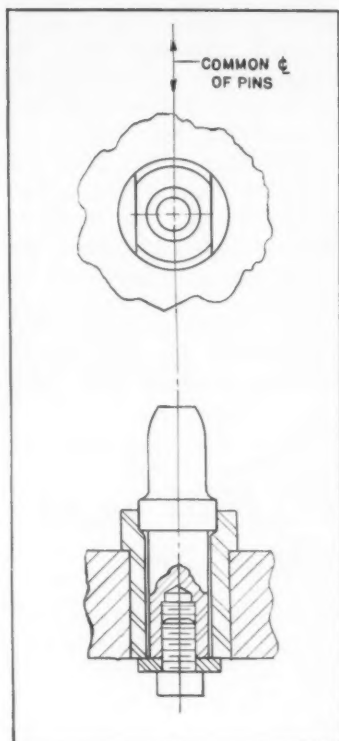




Fig. 3. Floating locator pin for accurate positioning of work-pieces. Minimum pin-to-hole clearance and a large tolerance on the hole center-to-center distance are possible.



#### Problem 1:

Find the diameter of the locator pin if the minimum diameter of the hole in the part is 0.250 inch and the tolerance on the distance between the hole centers is plus or minus 0.003 inch. A pin having a width of land of 0.084 inch (one-third of the pin diameter) is to be used.

The given data is:

$$\begin{aligned} r &= 0.125 \text{ inch} \\ y &= 0.003 \text{ inch} \\ x &= 0.042 \text{ inch} \end{aligned}$$

Substituting these values in the formula for  $R$ ,

$$\begin{aligned} R &= \sqrt{(0.125)^2 - 2(0.042)(0.003) - (0.003)^2} \\ &= \sqrt{0.015364} \\ &= 0.12395 \text{ inch} \end{aligned}$$

Therefore, the maximum diameter of the locator pin to be used for this part is 0.2479 inch.

#### Problem 2:

Find the width of the lands if the minimum diameter of the hole in the part is 0.250 inch and the tolerance on the distance between the hole centers is plus or minus 0.005 inch. Clearance between the locator pin and a work-piece having a hole of the minimum diameter within tolerance limits is 0.0005 inch.

The given data is:

$$\begin{aligned} r &= 0.125 \text{ inch} \\ R &= r - 0.0005 = 0.1245 \text{ inch} \\ y &= 0.005 \text{ inch} \end{aligned}$$

Substituting these values in the formula for  $x$ ,

$$x = \frac{(0.125)^2 - (0.1245)^2 - (0.005)^2}{2 \times 0.005}$$

$$\begin{aligned} x &= 0.009975, \text{ which can be rounded off to} \\ x &= 0.010 \text{ inch} \end{aligned}$$

Therefore the width of each land  $W$  is 0.020 inch.

When the land is calculated to be this narrow, it is better to make an oval pin, such as the one shown in Fig. 2, rather than to alter a standard pin.

To obtain the maximum cross-section on an oval pin, the greatest relief  $C$  is made only slightly larger than  $1/2$  the tolerance on the distance between the centers of the holes (or  $y$ ). This is important for the small pin sizes where strength is a factor. The relief is ground on the pin after it has been hardened and ground to the required pin diameter  $D$ . Relief radii are designated as  $L$  and are used in calculation of the set-over  $S$ . Only dimensions  $C$  and  $S$  are required before the relief can be ground. Derivation of the formula for  $S$  and its application in the form of a problem follow:

Referring to Fig 2,  $F$  is the midpoint of  $\overline{AB}$  and in the right triangle  $FAK$ , side  $\overline{AK}$  is equal to radius  $L$ .

Therefore

$$L = \frac{\overline{AF}}{\cos \theta} = \frac{\frac{\overline{AB}}{2}}{\cos \theta}$$

$$\text{but, since } \cos \theta = \frac{\overline{AE}}{\overline{AB}}$$

$$L = \frac{\frac{\overline{AB}}{2}}{\frac{\overline{AE}}{\overline{AB}}} = \frac{\overline{AB}^2}{2 \overline{AE}}$$

In the right triangle  $BAE$ ,

$$\overline{AE} = R - (x + C) = R - x - C$$

and

$$\overline{AB}^2 = \overline{BE}^2 + \overline{AE}^2.$$

However, as

$$\begin{aligned} \overline{BE}^2 &= R^2 - x^2 \\ \overline{AB}^2 &= R^2 - x^2 + (R - x - C)^2 \end{aligned}$$

Substituting this value in the equation for  $L$ ,

$$L = \frac{R^2 - x^2 + (R - x - C)^2}{2(R - x - C)}$$

But,

$$S = (L + C) - R$$

or

$$S = \left[ \frac{R^2 - x^2 + (R - x - C)^2}{2(R - x - C)} + C \right] - R$$

#### Problem 3:

Using the same values for  $R$  and  $x$  as in Problem 2 and letting  $C = 0.007$  inch (or 0.002 inch

greater than  $y$ ), find the set-over  $S$  for an oval relieved pin.

$$R - x - C = (0.1245 - 0.010 - 0.007) \\ = 0.1075 \text{ inch}$$

and

$$S = \left[ \frac{(0.1245)^2 - (0.010)^2 + (0.1075)^2}{2 (0.1075)} + 0.007 \right] - 0.1245 \\ = 0.0079 \text{ inch.}$$

When locating parts made of soft materials such as magnesium and aluminum, the holes are likely to be marred by a relieved type locator pin. In such cases, a floating pin similar to the one shown in Fig. 3 can be used. Flats, ground

on either side of the shoulder, allow the pin a sufficient movement along the common center line of the holes to accommodate all parts within the tolerance specified on the distance between the centers of the holes.

In addition, this type of locator pin is useful where it is impractical to reduce the pin diameter enough to take care of an exceptionally large tolerance on the hole center distance. Also, when it is necessary to hold part location closely, the floating pin should be used. Both pins can then be made to just enter the holes in the part, thereby reducing the error due to the pin-to-hole clearance necessary with relieved type locators.

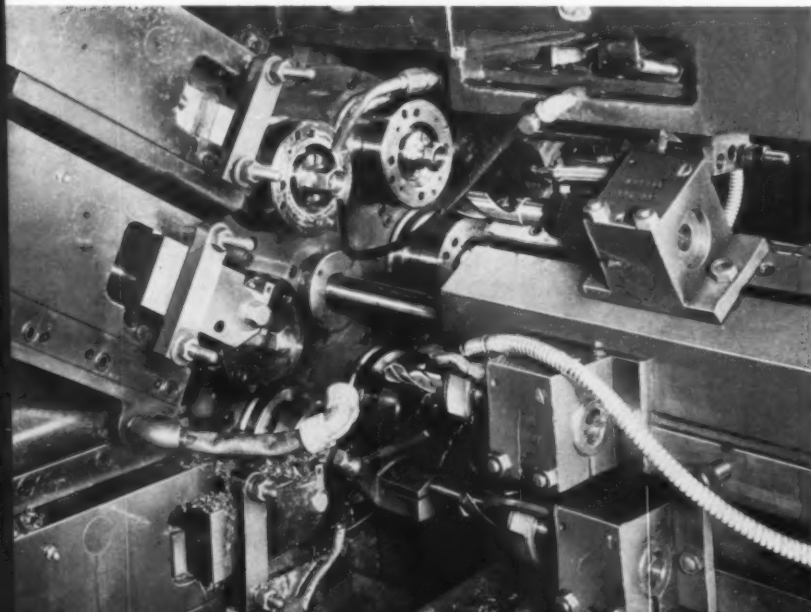
## Producing Hose Reel Nuts on an Automatic Bar Machine

Various types of special nuts are produced from time to time on automatic bar machines. One interesting instance is the manufacture of nuts for Alemite hose reels employed for automotive lubrication. At the Alemite and Stewart-Warner Instrument plant of Stewart-Warner Corporation, Chicago, Ill., this nut is made on a six-spindle Greenlee automatic bar machine from 1 3/16-inch hexagonal bars of AISI B-1113 steel. The machine, set up for production, is shown in the accompanying illustration.

Spindle speed for this job is 571 rpm which provides a work-surface speed of 205 fpm. The cycle time is 15 1/4 seconds with actual cutting time being 13 1/4 seconds at each station. A sulphur-base oil is used as a coolant. Cam ratio of the cross-slide in the first position is 6 to 1 with a 0.001 inch feed being used on a circular form

tool to make a necking cut. Concurrently, a 1-inch diameter drill is advanced on the tool-slide to a depth of 1/2 inch. Another circular form tool is used in the second position at the same cam ratio and with the same feed. This tool faces and chamfers the forward end of the nut and forms a slight portion of the rear. At the same time a 25/32-inch drill is advanced by the tool-slide to drill another step in the nut.

Operations at the third and fourth positions are limited to end-working. A counterbore is advanced by the tool-slide in the third position, and in the fourth position a standard recessing attachment is used. Tapping is performed by a standard threading attachment in the fifth position, with a 1/8-inch cut-off tool being used on the cross-slide. Speed ratio on the threading attachment is 5 to 1.



Front view of a six-spindle automatic bar machine setup for producing hose reel nuts. The primary and secondary drills are in the first and second positions, respectively, and the counterbore is in the third position.

# MATERIALS

**The properties and new applications of materials used in the mechanical industries**

## **Alloys Increase High Temperature Usefulness of Titanium**

Two titanium alloys with properties of formability and weldability have been introduced by Mallory-Sharon Titanium Corporation, Niles, Ohio. The first alloy, designated MST 2.5Al-16V (2.5 per cent aluminum, 16 per cent vanadium, balance titanium), was developed to meet the need for a titanium sheet alloy which could be readily formed and heat-treated to high strength. This alloy can be fabricated into parts which require severe forming. Yield strength in the solution-treated condition can be as low as 50,000 psi to permit relative ease of fabrication. Formed parts can then be aged to a tensile strength of 165,000 psi, a yield strength of 150,000 psi and still have a 5 per cent elongation. Age-hardened sheet has good short-time hot strength (yield strength about 100,000 psi up to 800 degrees F.).

The second alloy, designated MST-821 (8 per cent aluminum, 2 per cent columbium, 1 per cent tantalum, balance titanium) is a weldable sheet and bar material. This alloy has a very high temperature strength.

## **Epoxy Resin Cement Available in Self-Metering Tubes**

An aluminum-filled epoxy resin compound that repairs, joins, caulks, and bonds surfaces has been made available by Smooth-On Mfg. Co., 572 Communipaw Ave., Jersey City 4, N. J. The compound, called Metalset A4, comes packed in two collapsible tubes. By squeezing out identical lengths of each material from its respective tube and mixing to a uniform color, the compound is ready for use. It is water- and oilproof, resists acids and alkalis, and is non-flammable. It can also be applied to vertical surfaces without sagging and does not lose this quality even after extended storage. When mixed, the material hardens at room temperature, or for quick repairs it can be hardened with slight heating. Finished repairs can be machined by conventional methods to a feather edge and will withstand considerable mechanical shock.

Metalset A4 is used as a patching material for metals, wood, plastics, and concrete, and as a repair cement for leaking tanks, pipes, conduits, and windows. It can also be used as an adhesive material for bonding metals, wood, concrete, and glass.

## **Electrical Contact Cleaner Which Cleans, Preserves, and Lubricates**

A liquid electrical contact cleaner which cleans, preserves, and lubricates electrical contacts of almost all types has been produced by Caig Laboratories, 46 Stanwood Road, New Hyde Park, N. Y. Called Cramolin, it reduces contact resistance by dissolving and removing non-metallic layers of oxide and sulphide. It is non-poisonous and is inoffensive because it is free from acids and alkalis.

This cleaner decreases contact resistances to their minimum values, reduces sparking of brushes on commutators, protects against salt air and sulphidic atmosphere, and will not absorb moisture. Its maximum effective operating temperature range is -40 degrees F. to +302 degrees F. It is effective on all metals, including gold alloy; also galvanized, silver-plated contacts, and contact metals of copper, brass, bronze, or nickel.

## **Compound that Prevents Formation of Stress Relieving Oxide Scale**

A compound called Protect-O-Metal No. 2 has been made available by G. W. Smith & Sons, Inc., 1700 Spaulding Road, Dayton 3, Ohio. Used to prevent oxide scale formation on ferrous parts during stress-relieving operations, the material is first thinned with water and then painted or sprayed on the part to be handled. After the piece is removed from the furnace in the course of normal heat-treating and cooled, the compound is removed with a wet or dry rag or brush. The part will then be free of scale and ready for painting or other after-treatment. It may be used at any temperature up to 1500 degrees F. for any

length heating cycle. Its use enables the designer to specify close dimensional tolerances for parts.

### High Yield Strength Plate Steel Developed

A high-strength alloy steel plate for structural and pressure vessel use and for general machinery parts is currently being produced by the United States Steel Corporation, Pittsburgh 30, Pa., and its licensee, Lukens Steel Co., Coatesville, Pa. The steel is produced in two grades: HY-80, a weldable steel for construction use; and T-1, a proprietary grade which has a slightly higher strength. These steels have a yield strength ranging anywhere from 80,000 to 95,000 psi (0.2 per cent offset) and an elongation in 2 inches of 20 per cent.

Uses include high-strength members of ships' structures and hulls of submarines. Some consideration is being given to using it in reactor vessels for nuclear power plants. This would require plates up to 6 inches in thickness.

### Stair Tread with Abrasive Tread Plate Promotes Plant Safety

A precision-cast aluminum stair tread that provides safer footing for industrial workers and makes possible reduced maintenance costs has been placed on the market by the Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa. The stair tread was designed for use in industries where extreme weathering or

corrosive atmospheres are encountered. The grating is cast in one piece, and the open spaces have rounded joint-free corners which do not collect dirt. A tread plate of fused aluminum oxide abrasive which is bonded to the aluminum provides a rough, slip-proof front surface. The stair tread is available in various finishes, depending upon industrial conditions in the place of intended use.

### Rubber-to-Metal Adhesive Provides a Strong Bond

An adhesive for bonding cured natural or synthetic rubber to metal provides a bond so strong that the rubber will tear before it can be peeled from the metal. Announced by Adhesives Department, Raybestos-Manhattan, Inc., Bridgeport 2, Conn., the adhesive is designated Ray-Bond R-86001. It cures in twenty-four hours at room temperature and reaches maximum strength after seven days. To obtain maximum strength immediately, it may be cured in four hours at 120 to 140 degrees F. Rubber linings under peel or shear stress can be bonded for use in temperatures up to 100 degrees F.

The material is a two-component adhesive consisting of a synthetic resin base and an activator. The two components are mixed before application, and the resulting paste can be used for as long as four hours after mixing. If the activator is preheated, the components may be mixed in continuously for uninterrupted application, using conventional metering and mixing machines.

Cyclizing (etching) the surface of the rubber is desirable for maximum bonding strength. The



A one-piece precision-cast aluminum stair tread designed for easy maintenance and safe footing. Nosing material is Alcoa abrasive tread plate. Each tread will withstand loads exceeding 1 1/2 tons.



adhesive is used to bond metal, glass, ceramics or wood to metal; as a protective coating; and as a sealing and casting compound.

#### **Ultra-Thin Shim Stock of Various Metals Available**

The availability of ultra-thin shim stock rolled to tolerances accurate to 1/10,000 of an inch has been announced by the American Silver Co., 36-07 Prince St., Flushing 54, N. Y. ASC micro-shim stock is available in stainless steel, brass, and low-carbon steel. It is rolled to tolerances as close as plus or minus 0.0001 inch in thicknesses below 0.006 inch and to tolerances of plus or minus 0.002 inch in thicknesses from 0.006 inch to 0.010 inch. Stock is available in thickness gradations down to 0.0005 inch. It was designed to eliminate costly and time-consuming precision machining operations, particularly in miniaturization applications.

#### **Processes for Preparing Metals for Electroplating**

Two processes which offer a complete cycle for cleaning and preparing several metals to give maximum adhesion with various plated coatings have been announced by Enthone, Inc., 442 Elm St., New Haven, Conn.

The first, called the Enbond Z process, is for the treatment of zinc-base die-castings and utilizes both an anodic electrocleaner and a companion acidic activator to produce a uniformly active surface ready for standard copper plating operation. The cleaner and activator are both supplied as powders. The activator has been designed for long life, and both cleaner and activator are useful over a wide range of concentra-

tion, temperature, and time. This allows the process to be used in existing manual or automatic cycles without change in speed, unless it is desired for increased production or thickness of deposit.

The second process, called the Enbond BR process, is similar but is intended for preparation of brass and other copper alloys for any type of electrodeposit. Both cleaner and activator can also be used satisfactorily for the preparation of many steels.

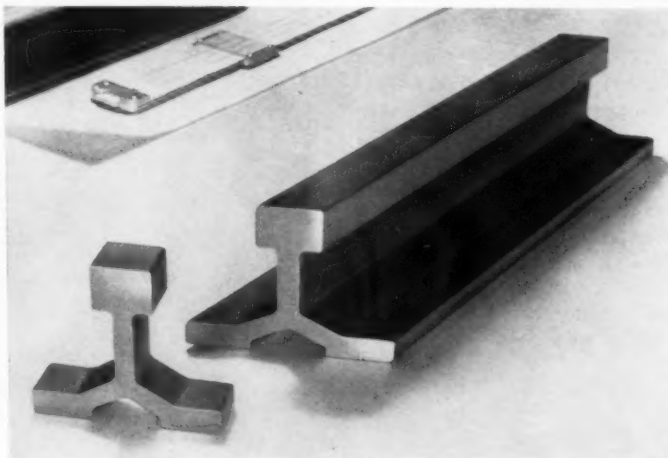
#### **Coating that Will Stick to Galvanized Aluminum and Terne Plate Surfaces**

Galvinox coatings available in red, gray, green, and metallic colors, and which can be applied right over new unpainted galvanized aluminum or terne plate surfaces, have been announced by the Rust-Oleum Corporation, 2799 Oakton St., Evanston, Ill. This formulation eliminates paint peeling problems, tedious etching of galvanized surfaces, and weathering. The coatings are used on gutters, downspouts, siding, roofing, and heating and ventilating ducts. Any high quality oil base house paint may be used over the coatings to match desired trim color.

#### **Development of Coupling Lubricant for Threaded Assemblies Announced**

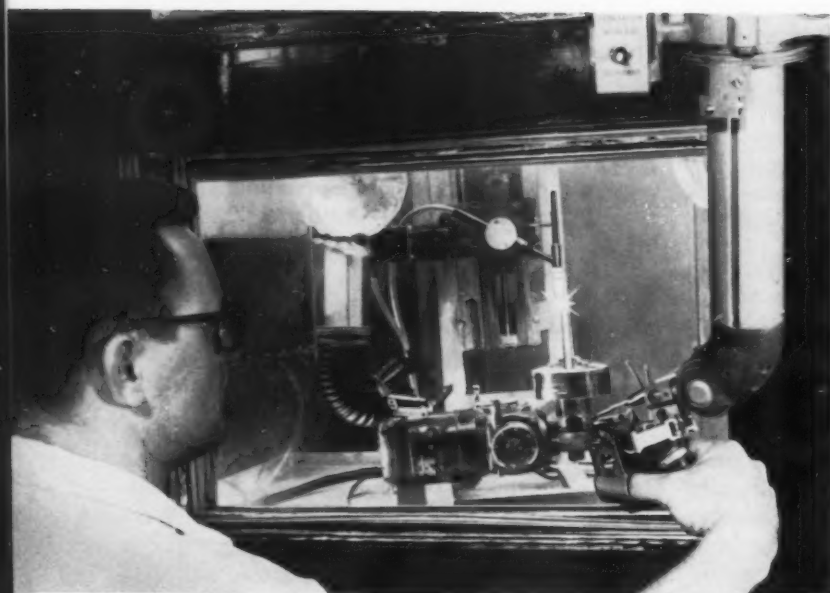
The announcement of a lubricant for threaded assemblies where high-pressure shock loading and high temperatures prevail has been made by the Warren Refining & Chemical Co., 5151 Denison, Cleveland, Ohio. This material, called "Warco Coupling Lubricant," is non-melting and has high adhesive powers. Among other applications it is recommended for drill collars, tool joints, drill tubing, drill couplings, and tool-bit threads.

The sections of steel rail shown have been extruded from SAE 1020 steel for an automatic oxy-acetylene flame-cutting machine of the Linde Co., a division of Union Carbide Corporation. Originally, the rails were cast in 6-foot sections and weighed 44 pounds. The extruded section now weighs 28 pounds and is easily kept straight. Engineers of the Linde Co. and the Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa., worked together to develop this redesigned rail.



# IN SHOPS AROUND THE COUNTRY

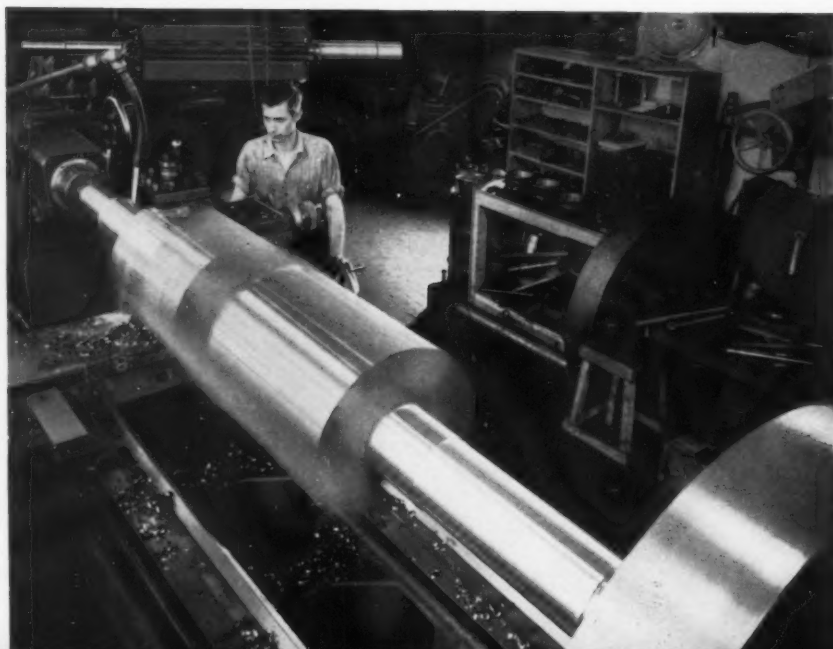
Camera highlights of some interesting operations performed in various metalworking plants throughout the nation



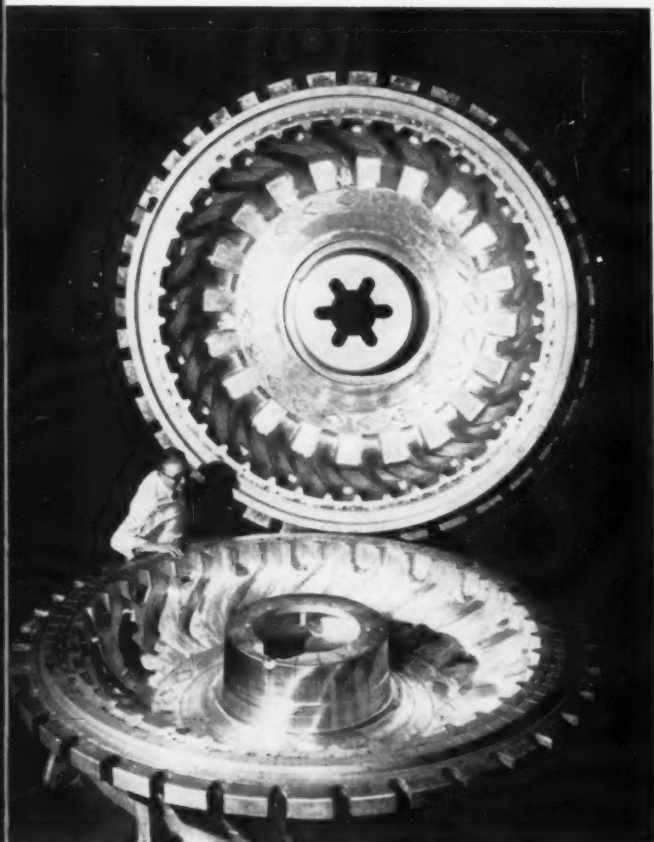
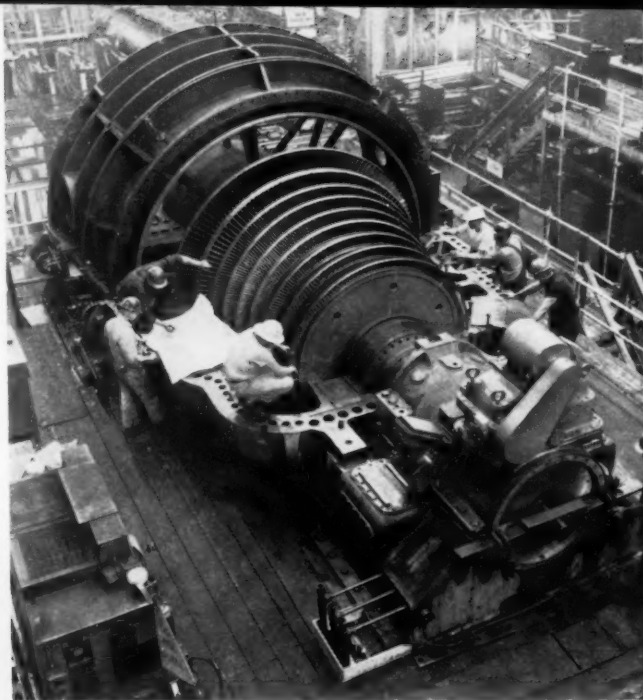
## REMOTE-CONTROL WELDING—

(Left) Looking through several layers of special lead glass, a technician manipulates this remote-control Heliarc welding unit at Oak Ridge National Laboratory, operated by the Union Carbide Corporation for the United States Atomic Energy Commission, Oak Ridge, Tenn. The unit seals radioisotopes in stainless-steel capsules for high-temperature or corrosive-solution applications.

**GLASSY ILLUSION—**(Right) Steel job appears transparent as it revolves on a Monarch lathe, at the Hahn Mfg. Co., Cleveland, Ohio. Work-piece is a marine armature shaft spider assembly (like the one on hoist behind operator). Machining includes turning shaft step and taking interrupted cuts on the welded spiders.

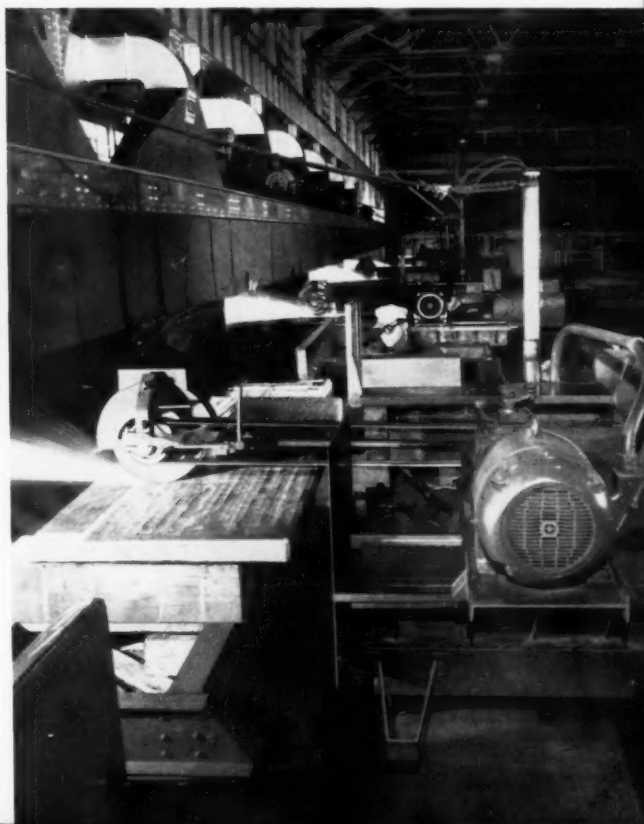


**ELECTRIC POWERMAKER**—(Right) Assembling a section of a steam turbine-generator at the General Electric Co., Schenectady, N. Y. Steam will be exhausted horizontally along turbine shaft axis and into condenser, rather than downward and into condenser, as in usual arrangement. This axial-flow exhaust is said to improve turbine efficiency and simplify foundation requirements.



**DOUGHNUT MOLD**—(Above) Twin aluminum tire mold sections—said to be the largest light-metal castings in the world—being readied in one of Alcoa's Cleveland foundries for the Goodyear Tire & Rubber Co. The molds, used in producing tires for construction equipment, are 8 feet, 10 inches in outside diameter, and have a combined weight of almost 8 tons.

**DAILY GRIND MOTORIZED** — (Below) Surface imperfections are removed by this row of seven grinders, at the Brackenridge, Pa., plant of the Allegheny Ludlum Steel Corporation. Machines move on rails up and down length of steel slabs. Hydraulic pressure holds grinding wheel against work. Equipment replaces older-style swing grinders, provides more uniform surfaces with less labor.



# Tables Facilitate Lathe Winding of Conical Coil Springs

GEORGE G. HERZL, Phoenix, Ariz.

**M**ANDRELS used to wind conical coil springs in a lathe can be developed from specifications for helical coil springs. At any point along the cone, the diameter of the mandrel should be equal to the diameter required for the same size of helical spring.

Tables such as those found in *MACHINERY'S Handbook* for piano wire give mandrel diameters for several spring sizes made in various gages of wire. The taper of a mandrel in inches per inch for a conical spring can be calculated by using the formula:

$$\text{Taper} = \frac{D - d}{L}$$

where  $D$  and  $d$  are, respectively, the table values for mandrel diameter, in inches, at the large and small ends of the required conical spring, and  $L$  is its axial length.

The mandrel is made of steel and is held with its smaller diameter in the chuck of the lathe as illustrated in Fig. 1. Since the larger coils have a tendency to slide toward the smaller ones, the spring is wound from the smaller end. In this way, the coils wound first do not interfere with those wound subsequently.

This method can be used to produce any desired conical spring made from piano wire,

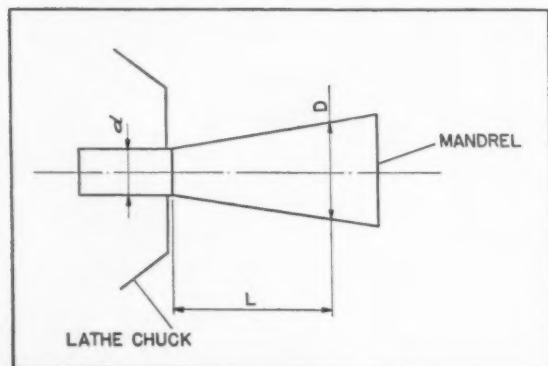


Fig. 1. Conical springs wound on this mandrel are started at the smaller end to prevent slippage of coils.

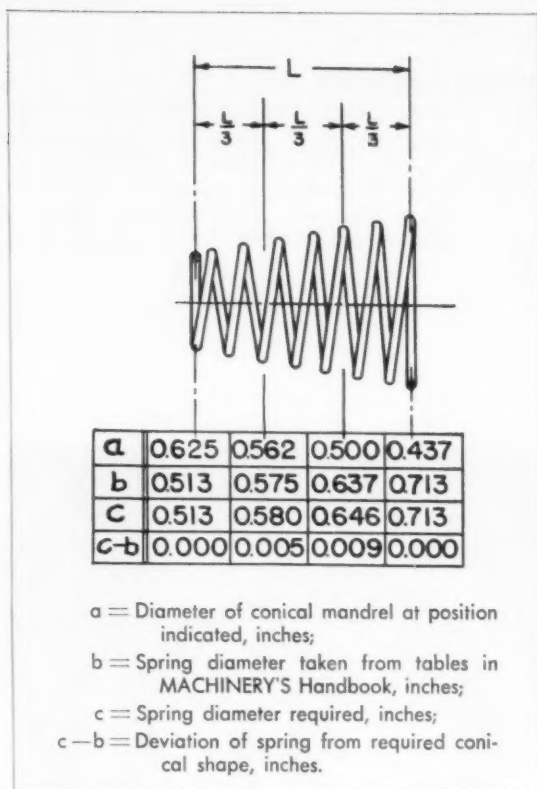


Fig. 2. Chart shows a slight deviation in the form of a spring made of No. 27 piano wire and wound on a conical mandrel.

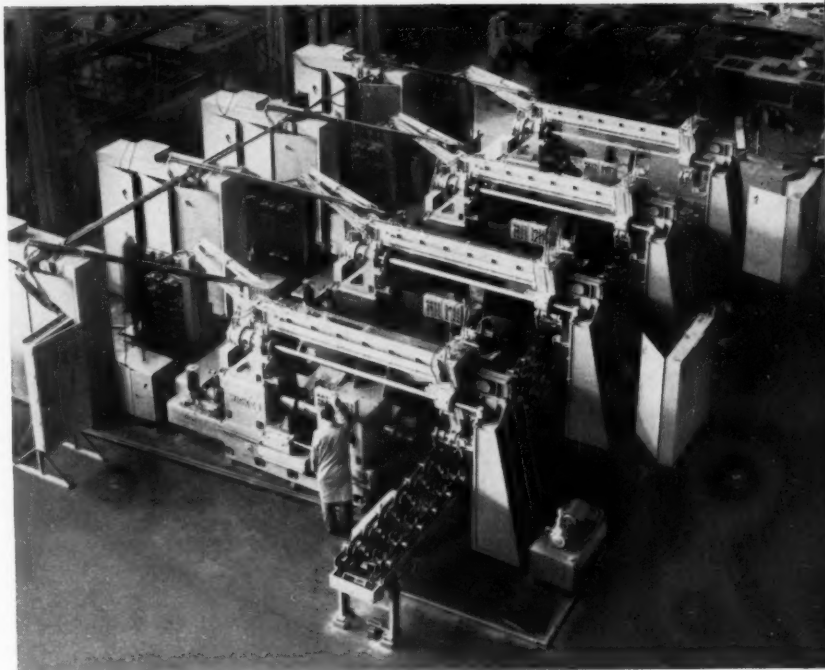
provided it is within the range of sizes included in the table. Springs made of the heavier sizes of piano wire that are wound on a conical mandrel will deviate slightly from the conical shape. The required mandrel diameters, other than the smallest and the largest, are not proportional to the resulting spring diameters. This is illustrated in Fig. 2 with an example for a spring wound from a No. 27 wire on a conical mandrel. Even in this heavier piano wire spring, the deviation is within normal spring tolerances.

## Iron Ore in Pellet Form Made from Taconite

Taconite, which is three times as hard as limestone and twice as tough as granite, can now be used to feed blast furnaces according to *Steelmasters*, official publication of the American Iron and Steel Institute. After considerable research it was found that taconite could be used if it were ground to the consistency of flour, thereby releasing fine particles of iron ore. The separated ore is rolled into balls and baked.



Machining of a forged-steel automotive crankshaft is one of the most difficult metal-cutting tasks. This is due mainly to its hardness and awkward configuration. The speeds and horsepower available and methods of supporting these easily deflected shafts have, until now, dictated the use of high-speed steel tools for turning crankpin diameters.



## Carbide Tooling and Single-Purpose Lathes Speed Machining of Forged Crankpins

COMPARED to the strides made in most facets of metal-cutting, advancements in the machining of forged-steel crankshafts have been limited. Progress in recent years has been confined to refinements such as changing to different materials—cast iron, shell-molded nodular iron, and modified cast steel. This shift stemmed from the superior machinability of these materials and permitted a switch from high-speed steel tools to the use of cemented-carbide tools operated at their lower cutting speeds.

Today, however, forged-steel automotive crankshafts can be effectively machined with carbide cutting tools. The Machine Tool Division of Wickes Corporation, Saginaw, Mich., has demonstrated a new concept in machining crankpin diameters that will be utilized by Pontiac Motor Division, General Motors Corporation, Pontiac, Mich. It consists of applying a group of four single-purpose lathes for progressively machining the Nos. 1, 2, 3, and 4 pin diameters of four-throw V-8 crankshafts. Each of these simply designed machines is fed by a single, automated transfer line (heading illustration).

This method of machining is usually applied to larger crankshafts, such as those used in heavy diesel engines. It allows:

1. Carbide cutting tools to be used efficiently for machining forged crankpins (250 sfm [surface feet per minute]);
2. Production to be doubled in the same, or less, floor space;
3. Tooling costs to be greatly reduced;
4. The possibility of machining crankshafts of several different specifications on a single line;
5. Five-minute tool changes per lathe;
6. Machining of only one crankpin at each station; and
7. Continued production of unaffected machines while others are down for tool changes.

Each machine in the line is a double-end drive unit powered by a 60-hp direct-current, variable-speed motor. A three-to-one speed range is available for cheeking and plunge-forming the counterweights and crankpins.

The operating cycle of each machine in the line is automatic and independent. During a

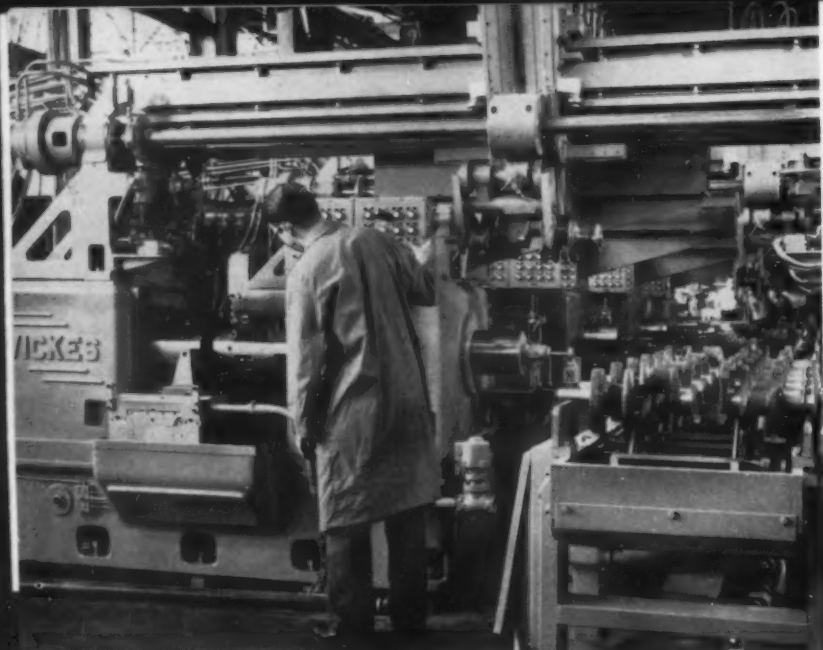


Fig. 1. First machine of a four-station in-line setup for machining forged-steel crankpins. Starting point of an automatic, straight-through conveyor that links the four machines together is at the right.



Fig. 2. Crankshaft is elevated at the loading station in line with the No. 1 lathe. Fingers on an extended loading arm grip the shaft on main bearing surfaces Nos. 1 and 4.

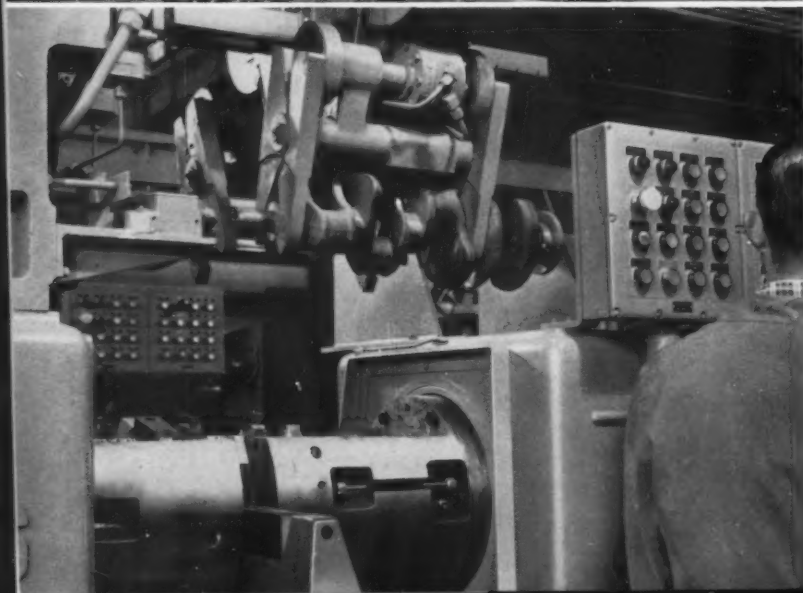
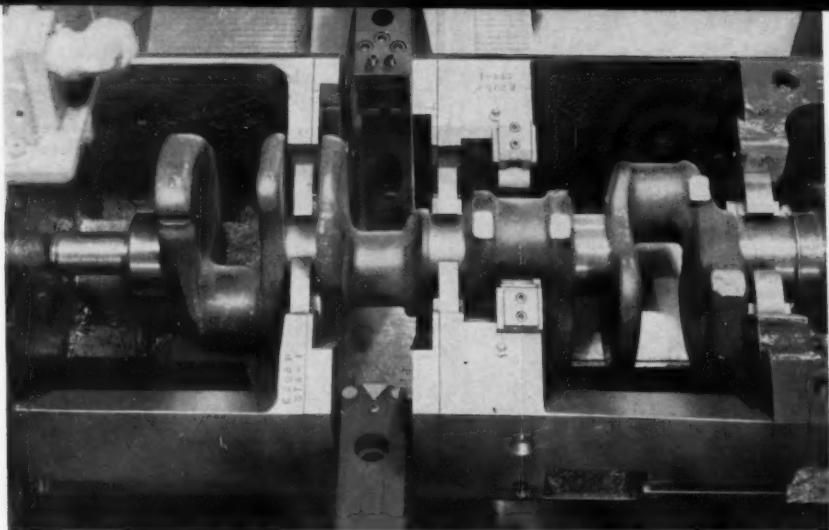


Fig. 3. After gripping the shaft (Fig. 2), the loading arm is raised. The cross-head travels to the left, aligns the crankshaft with the work area, and lowers it into the work-cradle.

Fig. 4. Crankshaft has been seated in first-station work-cradle. Clamps close automatically on main bearing surfaces Nos. 2, 3, and 5 in preparation for machining the No. 2 crankpin.



typical run, crankshafts are loaded in V-notches along the first section of the automatic conveyor (right, Fig. 1). All main bearing surfaces must first have been machined. As the shafts are placed on the conveyor they are automatically advanced, one notch at a time, up to a transfer point in line with the first machine. This movement continues until the first section of the line is loaded.

When a crankshaft arrives at the No. 1 loading station, it is elevated. A loading arm then descends and a pair of fingers grip the shaft on the Nos. 1 and 4 main bearing surfaces, Fig. 2. The loading arm rides in the front face of a wedge-shaped cross-head. An overhead cross-rail supports the head and guides it about 5 feet to the left until the crankshaft is aligned with the working area of the machine, Fig. 3. In this position, the loading arm lowers the crankshaft and deposits it in the work-cradle of the lathe.

After the crankshaft has been seated in the work-cradle, it is automatically clamped (Fig. 4) and the cutting tools brought into action. At this first station the crankshaft is hydraulically clamped on its Nos. 2, 3, and 5 main bearings. The No. 3 pin diameter is used for equalization and drive.

No centers are required to either support or locate the crankshaft in the work-cradle. It is

claimed that the centering operation could be eliminated by using a similar machine line to turn the main bearings.

Two carbide cutting tools are used at each station. They approach the work from both the front and the rear as illustrated in Fig. 5. The tools are carried by slides which are moved by means of a hydraulic cylinder acting through a cam-bar. Two circular inserts and one triangular insert are mounted in the front-slide tool. The circular inserts take cheeking cuts across the counterweights and the triangular insert plunge-forms the center area of the crankpin. The rear-slide tool mounts two triangular inserts to assist in plunge-forming. There is an overlapping of the areas machined by these two inserts and the area machined by the single triangular insert in the front-slide tool. Both of these Wesson Multi-cut band type tools can be seen in Fig. 6.

Each of the circular inserts is held on a slight angle to provide the necessary negative rake. The triangular tools approach the work with a small positive rake. Rate of feed for plunge-forming is held to 0.010 ipr (inch per revolution). During the initial tool movement, involving an interrupted cheeking cut, feed rates range from 0.040 to 0.060 ipr. Total depth of plunge into the crankpin averages 1/4 inch at speeds of 250 sfm.

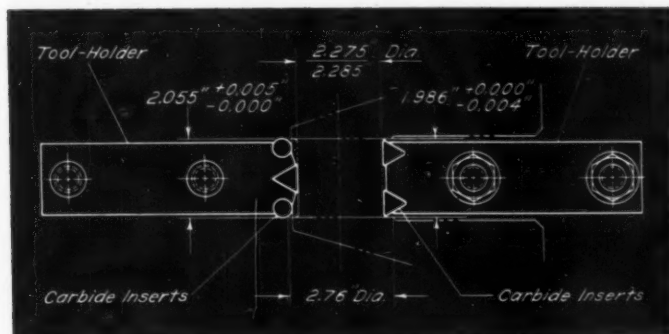


Fig. 5. Both the front- and rear-slide tools are shown in their respective positions after completing a plunge cut. Required crankpin diameter is controlled by the in-feed limit of each tool.



Fig. 6. Front-slide tool, right, and rear-slide tool, left. Although these band type tool-holders were especially designed for machining forged-steel crankpins, all carbide inserts are standard.

The tools advance, plunge cut, and retract in less than one minute. When the work-cradle has come to rest, the clamps are released and an unloading arm—riding in the rear face of the cross-head—moves down. A pair of fingers grip the crankshaft and raise it clear of the lathe. At this moment the front arm descends and reloads the work-cradle with another crankshaft. The cross-head moves to the right, the unloading (rear) arm deposits the machined crankshaft on the downstream side of the conveyor, and the load-

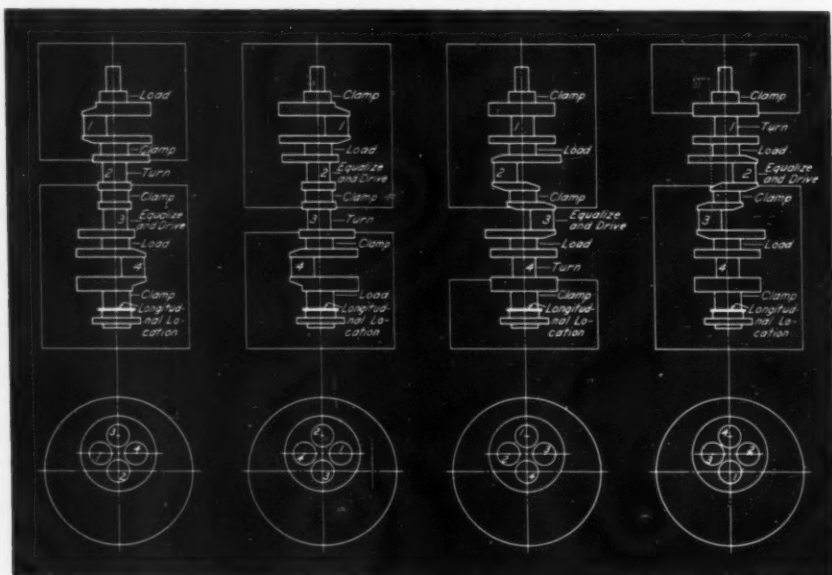
ing (front) arm picks another shaft from the upstream side of the conveyor. This automatic cycle is repeated continuously to provide uninterrupted production.

Although transfer movements to and from the next three stations are identical, a different pin is machined at each. Locating, clamping, and driving of the crankshaft are modified at each succeeding station to compensate for the position of the pin involved, as can be seen in Fig. 7. Total capacity of the automated transfer line is thirty-two crankshafts, eight between each station. Hourly output of each four-station machine group is fifty crankshafts.

In the event that one of the stations is forced to shut down temporarily for a tool change, the flow of shafts to the following station will, of course, be halted. Since tools can be changed in five minutes and eight crankshafts are carried between stations, subsequent operations need not be interrupted.

Functioning of the work-transfer conveyor is such that the first crankshaft delivered to it from the reactivated machine is automatically advanced to the vacant position nearest the next station. This is repeated until the section of conveyor between stations is loaded to capacity. Thus, any gaps on the transfer line are eliminated, and full production is resumed.

Fig. 7. Each of the four crankpins is machined on a different lathe. Diameters and cutting tools are identical, but work-cradles vary in design depending on the location of successive crankpins.





## Prizes Awarded in

# INGENIOUS MECHANISMS COMPETITION

Winners in MACHINERY's Ingenious Mechanisms Competition that was completed August 31, 1957, have been announced as follows:

### First Award—\$300

"Speed-Reducing Gear Transmission with Variable Ratios"

B. J. Popper, Kfar-Ata, Israel

### Second Award—\$200

"High-Speed Label Die-Cutting Machine"

Ralph T. Stewart, Winston-Salem, N. C.

### Third Award—\$100

"Compensating Device for Height Gage"

John E. Gilmour, Nyack, N. Y.

### Four Additional Awards—\$50 Each

"Multiple-Revolution Clutch Mechanism"

H. B. Schell, Brooklyn, N. Y.

"Intermittent Drive with Positive Locking During Dwell Cycle"

J. J. Decoulos, Peabody, Mass.

"Springs Cushion Shock Loads in Gear Drive"

Clint McLaughlin, Rockaway Beach, N. Y.

"Pi Ratio Universal Rack-Cutting Attachment"

James R. Hansen, Bellevue, Wash., and

Alfred K. Thornton, Yonkers, N. Y.

Many excellent articles were entered in the competition. Honorable mention was awarded to the ingenious mechanisms submitted by the following contributors:

Cliff Bossman, Dayton, Ohio

William N. De Turk, Hatfield, Pa.

William Foster, New Hyde Park, N. Y.

George G. Herzl, Phoenix, Ariz.

Oscar O. Nagelis, Santiago, Chile

Karl W. Nittel, North Attleboro, Mass.

Bart R. Obra, Detroit, Mich.

George D. Pheil, Racine, Wis.

Fritz Twelsiek, Dusseldorf, Germany

Prize-winning articles, as well as those receiving honorable mention, will be published in the Ingenious Mechanisms Department during the coming months. This Department—a regular feature of MACHINERY since 1927—is an invaluable aid to designers. It contains articles describing mechanisms or movements that can be applied in designing automatic machines and other devices that differ widely in purpose. Contributions are always welcome and MACHINERY's high-level space rates will be paid for all acceptable articles. In addition, many of these articles are later compiled and reprinted in book form for permanent reference (INGENIOUS MECHANISMS, Vols. I, II, and III, published by THE INDUSTRIAL PRESS).

## Signs of Trigonometric Functions

D. S. DAVIS

Professor of Engineering, University of Alabama

Here is a way to remember the signs of the various trigonometric functions (sine, tangent, and cosine) of angles in the four quadrants. Just think of the sentence, "ALL SUCH TRIGONOMETRY CLINGS." Note that the four words stand for the four quadrants, and that the initial letters of these words stand, in turn, for "All," "Sine," "Tangent," and "Cosine," as shown below:

| I   | II   | III          | IV     |
|-----|------|--------------|--------|
| All | Such | Trigonometry | Clings |
| l   | i    | a            | o      |
| l   | n    | n            | s      |

"A" in the first word shows that all functions are positive in quadrant I; "S" in the second word shows that the sine is positive in quadrant II; "T" in the third word shows that the tangent is positive in quadrant III; and "C" in the fourth word shows that the cosine is positive in quadrant IV.

The same functions in other quadrants are negative. For angles in any quadrant, the signs of the secant and cosine are always the same, as are those of the cotangent and tangent, and those of the cosecant and sine. This follows since members of each pair are mutual reciprocals.

# Confidence and Service Stressed by Machine Tool Distributors

**C**ONFIDENCE in the future as well as ways and means of "Serving Tomorrow's Markets" were the principal subjects of discussion at the Thirty-Third Annual Meeting of the American Machine Tool Distributors' Association held at the Hotel Cleveland, Cleveland, Ohio, September 22 to 24, inclusive. More than 400 members and guests of the AMTDA, including many machine tool builders, heard the principal speakers at the meeting predict greater use of machine tools as the key to greater productivity and stiffer competition from European machine tool builders. They also expressed confidence that the general trend of the gross national product will continue to follow the economic growth of the last ten years.

The president of the Association, Joseph F. Owens, Jr., of Syracuse, N. Y., urged recognition of "the changes taking place on the American scene, and the important part that our industry plays in them." He cited as examples the trend toward greater employment in the service industries rather than in the direct production of goods and the steady shortening of the average work week. Mr. Owens pointed out that the only way national needs can be met is through greater use of more and better machine tools. In them are the direct keys to increased productivity in manufacturing. The indirect keys to increases in these fields lie in production of more and better farm machinery, construction machinery, and mining equipment. Mr. Owens predicted that young people will be given more time for education, old people more time for retirement, and the population as a whole more time for recreation and leisure. "The requirement for our product is there," Mr. Owens concluded, "but it is up to us to go out and sell it. We will undoubtedly have ups and downs of a short-term nature—but long term, the trend is favorable to good business."



Fabian Bachrach

Newly elected president of the American  
Machine Tool Distributors' Association:  
Frank H. Habicht

The principal speaker at the first general session was Burnham Finney, editor of the *American Machinist*, who reported on world machine tool production based on a heretofore unpublished study made by the European Committee of Machine Tool Builders. Soviet plans to increase machine tool production by 1960 may close the gap on our two-to-one lead over Russia, said Mr. Finney. According to the latest available figures, American machine tool builders lead the whole world, producing almost one-third of all machine tools in 1955. The recent study also showed that Russia alone produced approximately 14 per cent of the world's machine tools, but together with her satellites accounted for close to 23 per cent, or nearly one-quarter, of the world total.

The latest information from behind the Iron Curtain reveals that Russia expects to expand machine tool production from 125,000 units in 1956 to 200,000 in 1960. Since machine tool production in the United States is not estimated to grow as rapidly in the same period, Mr. Finney suggested that Russia may partially close the gap during the next three years. The report also indicated that West Germany produced about 16 per cent of the world total, rising from nothing only eight years ago to outstrip both Great Britain and Russia in machine tool production in 1955.

One of the outstanding features of the meeting was a lively panel discussion devoted to "The Handling of Service and Parts," which was held on the afternoon of September 23. Charles O. Herb, editor of *MACHINERY*, acted as moderator. Other members of the panel included: John Bateman, chief engineer, Hamilton Standard Division, United Aircraft Corporation, Windsor Locks, Conn.; Carl M. Beach, vice-president and domestic sales manager, Cincinnati Milling Machine Co., Cincinnati, Ohio; and Phil M. Hoff-

man, president, Hoffman Marquard Machinery Co., St. Louis, Mo.

The panel in general agreed that there was a need to review the problems more thoroughly to determine how builders and distributors could better serve industry in repair and maintenance service. It was suggested that improvement of the lines of communication between the customer, distributor, and builder of machine tools would help reduce much of the current difficulty. Also discussed were questions relating to demonstration, service during warranty, and service and parts after warranty. The consensus was that the industry had done a consistently good job despite scattered instances of delay and inadequate handling of repairs and service. However, as machines become more complex, the industry will have to find new ways of meeting service needs.

William C. Allen, director of Manufacturing Planning, Westinghouse Electric Corporation, Pittsburgh, Pa., prefaced his speech on "Meeting Tomorrow's Demands Today" with the statement that "as of today, I know of no major company or major industry in the United States which is planning its future without complete confidence that the general trend of gross national product will continue to reflect the economic growth of the last ten years. We are, therefore, inclined to ignore the cyclical peaks and valleys which we have lived through and base our concept of tomorrow's demands on trend."

Mr. Allen went on to say, "Actually we face a shortage of labor, and our only salvation is to provide machinery to meet this shortage." He pointed out that the present continued increase in mechanization of manufacturing operations must be sharply accelerated in order for the nation to follow the trend of increased gross na-

tional product. Citing experience at Westinghouse, Mr. Allen discussed the principles being employed in planning for further automation. He asserted that it is necessary that one set a fast pace in order to keep up with today's demands.

Emphasizing that schools of engineering have undergone a great transformation over the past twenty years, Dr. T. Keith Glennan, president of the Case Institute of Technology, Cleveland, Ohio, proposed a five-part educational program to meet tomorrow's demands for engineers. He advocated (1) special sub-professional training schools for senior technicians to handle routine engineering tasks; (2) degree-granting undergraduate schools concentrating on the fundamentals of science and technology; (3) engineering clinics for specialized training in industrial practice; (4) graduate schools to produce engineering faculty, research engineers and engineering scientists; and (5) special programs for retraining and upgrading the practicing engineer as science and technology continue to advance. Dr. Glennan urged greater support from industry to help meet tomorrow's requirements for professional engineers.

The newly elected officers of the AMTDA were installed at the closing session. Elected president of the Association for the forthcoming year was Frank H. Habicht, who is president and general manager of Marshall & Huschart Machinery Co., Chicago, Ill.; first vice-president, J. O. Ellison, who is president of Harron, Richard & McCone Co. of Northern California; second vice-president, J. Russell Clark, who is president of the White Star Machinery & Supply Co., Inc., Wichita, Kan.; and secretary-treasurer, George E. Merryweather, who is vice-president and secretary of the Motch & Merryweather Machinery Co., Cleveland, Ohio.



Other new officers of the American Machine Tool Distributors' Association: (Left to right) first vice-president, J. O. Ellison; second vice-president, J. Russell Clark; and secretary-treasurer, George E. Merryweather

## Cincinnati Milling Holds Technical Activities Seminar

Approximately 1200 engineers and production men of industrial concerns the country over attended the sessions of a technical activities seminar held by the Cincinnati Milling Machine Co., Cincinnati, Ohio, September 30 to October 3, inclusive, and October 7 to 10, inclusive. Groups of about 300 men attended each of four two-day sessions. These groups were divided in half so that 150 men followed Program A on one day and Program B the next, or vice versa.

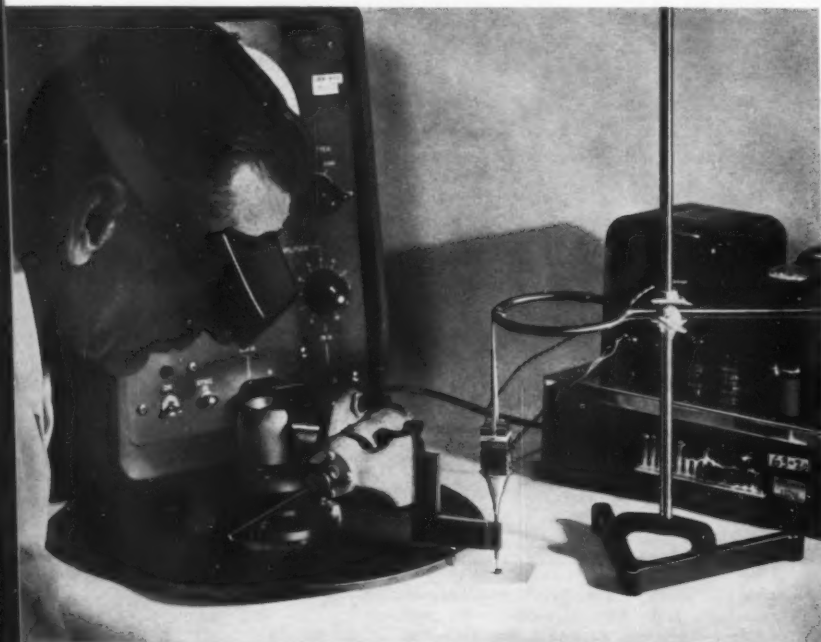
The first session of Program A started with a welcoming address by Frederick V. Geier, president of the company, and an outline of the seminar given by Hans Ernst. Next were papers and discussions on the Cincinnati Digi-Log numerical control, including a discussion of the difference between digital and analog computers. Of exceptional interest were the following papers which dealt with a new machine designed for producing a spiral point on twist drills. The singular advantages of drills ground in this manner were demonstrated on closed-circuit television and by photographic slides.

In the afternoon session, electrohydraulic control systems were the subject of several papers and discussions. Chipless machining was the sub-

ject of another lecture which dealt with the techniques followed in the use of Hydrospro and Hydroform machines. A tour of the showroom, Plant 1, and the Process Machinery Division concluded the day's technical activities.

The first technical lecture of Program B came under the heading "Machining the Unmachinable." One paper dealt with the problem of machining difficult materials, while a second paper considered the elements of electrodischarge machining. Then followed two papers dealing with the status of ceramic tools today and their future possibilities.

Cutting fluids were considered in the first portion of the afternoon session during which research in cutting fluids, their development, and practical applications were discussed. Factors affecting the wear of grinding wheels, and the physical and chemical nature of abrasive wear were the subjects of the next papers and discussions. The final session of Program B consisted of a tour of the showroom of the Cincinnati Lathe & Tool Co., the physical research department, and the Products Division plant. On each evening, the guests were treated to a social hour, dinner, and entertainment.



Sound waves that have a frequency twice as high as the human ear can detect are being used to power a drill which bores microscopic holes in hard ferrite materials. The drill was devised at Lockheed Missile Division's research and development center in Palo Alto, Calif. These ferrites, nearly as hard as diamonds, are man-made ceramic magnets. They are employed as magnetic memory cores in electronic computers and data storage devices. The cores are tiny ring-shaped pieces with faces measuring only 0.045 inch. Holes as small as 0.005 inch in diameter are accurately drilled in the magnetic core faces, through which fine wire is threaded. The drill operates at a frequency of 28,000 cycles per second with the output of an oscillator being amplified to drive it. A rapid expansion and contraction of the magnetic drill is caused by the current passing through windings around the drill body. This drill body repeatedly jars against a brass bit tipped with diamond paste abrasive. The bit produces clean-cut accurate holes in a few minutes.



**MACHINERY'S**

*Reference Section*



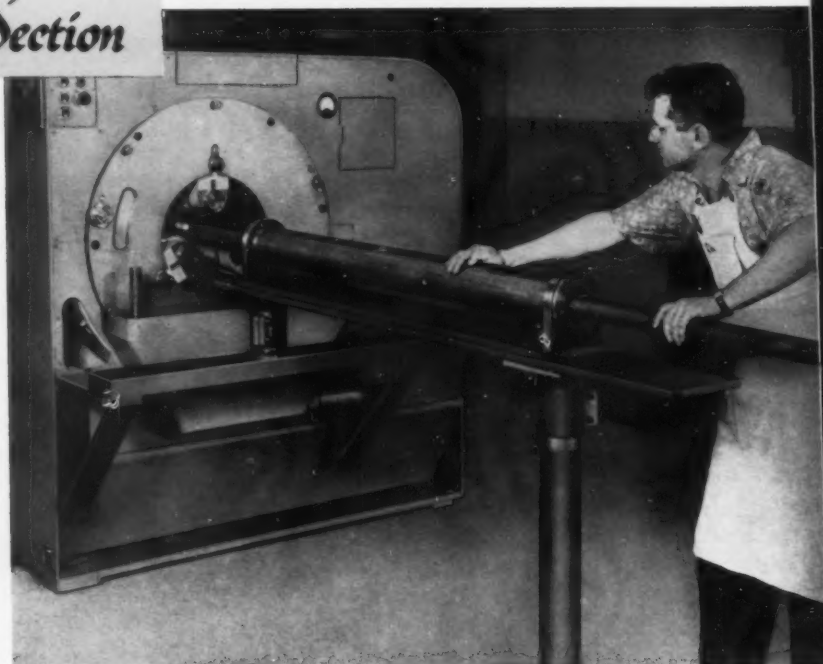
# **THREAD ROLLING**

## **MAY BE FOR YOU**

Compiled by  
**RAYMOND H. SPIOTTA**

**November 1957**

# Thread-Rolling May Be for You



Rolled threads have many advantages to offer. Strength, accuracy, and surface finish can be counted among the characteristics in which they excel. These qualities, when coupled with unusually high rates of production and the absence of chips, make this a very desirable means of thread forming.

Compiled by **RAYMOND H. SPIOTTA**  
Associate Editor

**C**OLD-FORGING is perhaps the most adequate description of the thread-rolling process. A cylindrical blank, having an outside diameter falling between the major and minor diameters of the finished thread, is rotated between hardened-steel dies bearing the reverse thread form. The die threads penetrate the blank surface to form the roots and displace material radially outward to form the crests. This effect

on the work blank can be visualized by referring to Fig. 1. Unlike other threading processes, metal is neither removed nor wasted.

Thread-rolling is no newcomer to the metal-working field. It has been around for a considerable period of time. The process was first demonstrated early in the 19th Century. However, it was not used in regular production until the close of that century. From that time until the

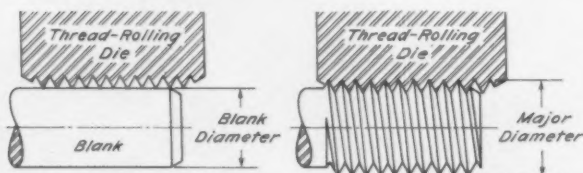


Fig. 1. (Above) As the thread-rolling die penetrates the surface of the blank to form the thread roots, displaced material flows outward to form the crests.

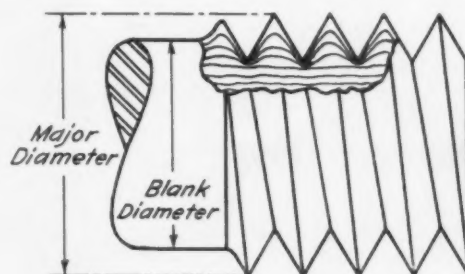
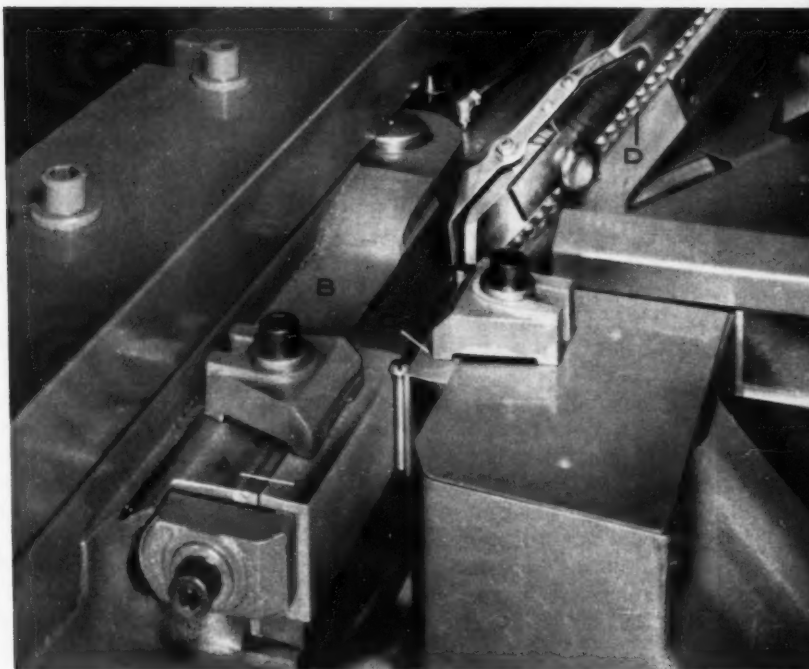


Fig. 2. (Right) Fibers of rolled threads are reformed, as in forging, into continuous unbroken lines.

**Fig. 3. Threading a round-head machine screw on a reciprocating thread-rolling machine. The blanks are delivered to moving die (A) and stationary die (C) from feed chute (D).**



early 1940's it was confined almost entirely to the fastener industry.

Slowness of industry to be attracted to thread-rolling was due in a great part to the low quality of the early products and to the inflexibility of the equipment then available. Admittedly, the first cold-forged fasteners were inferior products. Unreliability can be attributed to the wrought iron and Bessemer steel used as raw material which tended to fracture during heading and split during rolling. Thread form and lead were also unreliable because accurate dies were difficult to obtain and machines were designed too light and without the means of making fine adjustments easily.

Progress was made in overcoming these early drawbacks. Open-hearth steels were soon developed with excellent cold-forging properties that practically eliminated weak heads and split threads. Thread-rolling machines were made heavier and more reliable; thread-rolling dies were developed with accuracy comparable to that of thread gages. By the late 1930's rolling had been accepted throughout the fastener industry. The aircraft industry specified rolling for Classes 4 and 5 threads during World War II.

Although the initial cost of thread-rolling equipment may seem high in some instances, the ultimate cost is low due to long die life, absence of tool maintenance, and the high production rates obtainable. Rolling is limited almost exclusively to the forming of external threads.

### ***How Rolling Affects Mechanical Properties of Threads***

Cold-forging that threads receive during the rolling process strengthens them in three ways—tension, shear, and fatigue resistance. Static-tensile tests have reported increases in the ultimate strength of the parts on the order of 10 per cent.

Thread fibers are not severed. Instead they are re-formed in continuous unbroken lines following the thread contours, as can be seen in Fig. 2. Rolled threads have increased resistance to stripping because such failures are compelled to take place across, rather than with, the grain flow.

Fatigue resistance is realized in several ways. Threads are produced with burnished roots and flanks, free from surface imperfections that might prove to be starting points for fatigue failure. Surface layers of the thread, particularly those in the roots, are stressed in compression. These compressive stresses must be overcome before the tensile stresses which cause fatigue failure can be built up. Improved fatigue strength is reported to be on the order of 50 to 75 per cent. Tests on bolts first heat-treated to a hardness of 36 to 40 Rockwell C and subsequently rolled show an increased fatigue strength ranging from five to ten times that of cut threads.

With sufficient care, extremely accurate threads can be produced by any of the standard thread-

ing methods. Rolling is unique, however, in its inherent ability to maintain the accuracy of the original machine setup even during extended production runs.

The thread form on a set of rolling dies is faithfully reproduced on the parts and does not change appreciably during the entire die life. Wear on a die is distributed over a broad surface and the rolling action is relatively free of friction. The thread form cannot be altered by improper sharpening as no sharpening is ever required. Dies fail either by fatigue-crumbling of the crests, or by spalling away of the entire thread. Either of these failures can be readily detected on the dies so that replacement can be made before the threaded product is affected.

Production of accurate threads requires close control of pitch diameter, thread angle, lead, and taper. Major, pitch, and minor diameters depend on the diameter of the blank, thread form of the dies, and setup and rigidity of the equipment used. Controlling the diameter of plain cylindrical blanks within close tolerances is relatively easy. Taper depends on the straightness of the blank and the setup of the dies—both of which are easily controlled.

Thread angle on the work is dependent on the accuracy of the rolling dies. Lead accuracy relies on the accuracy of the dies and also on the material being rolled. In most cases the lead of the die thread is reproduced exactly on the material being rolled. Some harder materials, however, tend to spring back after rolling, resulting in a

slightly contracted lead. In these instances, dies with expanded leads can be used.

Unlikely as it may seem, the surface finish of rolled threads is usually smoother than that of the dies used in the process. This can be attributed to the slight burnishing action of the die against the thread surface. Thread finishes commonly produced by various threading methods are compared in Table 1.

## Reciprocating (Flat Die) Thread-Rolling Machines

Equipment and tools used for producing rolled threads are usually dependent on the nature of the parts, specifications of the thread, and the quantity required. A majority of the threads produced today are rolled on special thread-rolling machines and on conventional automatic screw machines. Thread-rolling machines use either flat or cylindrical dies while the automatic screw machines use cylindrical thread rolls for either in-feed or end-feed rolling.

A large percentage of headed fasteners, such as wood screws, self-tapping screws, machine screws, drive screws, and screw nails, are threaded between a pair of flat dies on a reciprocating type of thread-rolling machine. These machines are made in a number of sizes, each intended to handle specific diameter ranges.

Two dies are used such as those shown threading a round-head machine screw on a Hartford-Special machine in Fig. 3. The moving die A is

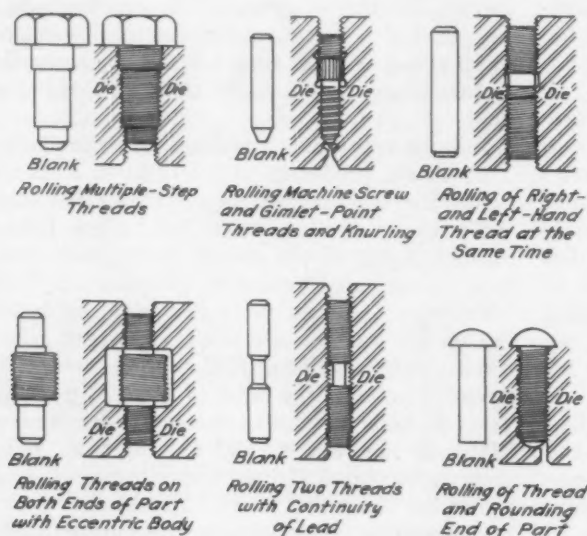


Fig. 4. Several of many special applications for which flat dies can be designed. By combining various threading or forming steps in one die stroke, secondary operations are saved.



**Table 1. Comparison of Common Thread Finishes**

| Type of Thread | Surface Roughness, Micro-Inches |     |    |    |    |   |   |   |
|----------------|---------------------------------|-----|----|----|----|---|---|---|
|                | 250                             | 125 | 63 | 32 | 16 | 8 | 4 | 2 |
| Screw machine  |                                 |     |    |    |    |   |   |   |
| Chased threads |                                 |     |    |    |    |   |   |   |
| Milled threads |                                 |     |    |    |    |   |   |   |
| Ground threads |                                 |     |    |    |    |   |   |   |
| Rolled threads |                                 |     |    |    |    |   |   |   |

clamped to a reciprocating slide *B*. Facing the moving die is a stationary die *C*. Screw blanks are gravity-fed down track *D* which leads them to the rear of the stationary die. As the reciprocating slide advances, the blank is gripped between the two die members and forced to roll forward in contact with the thread form. At the end of the stroke (illustrated) the completely threaded part drops from the die, through a funnel-shaped opening, and into a tote box beneath the machine.

Only one blank is threaded during each forward stroke of the machine. The blank is carried in a straight line, there being no axial movement imparted. Final thread diameter is controlled by two factors—blank diameter and the distance between die faces. The particular machine illustrated will handle threads ranging in size from

No. 6 (0.138) to 5/16 inch at a production rate varying from 80 to 140 pieces per minute, depending on screw size.

Flat dies can be designed to handle many special applications such as rolling two or more different threads simultaneously, threading and knurling, rolling right- and left-hand threads at the same time, and many others. Some of the more common examples of this type of work can be seen in Fig. 4.

#### ***High Production Rates with Planetary Thread-Rolling***

Thread-rolling at a fast rate is perhaps one of the identifying features of the planetary type machine. Here, the blank is rolled between a central circular die rotating on a fixed axis and a

**Fig. 5. Threads are being formed on a screw blank as it is rolled between an outer stationary die and a rotating circular die on this planetary type machine.**

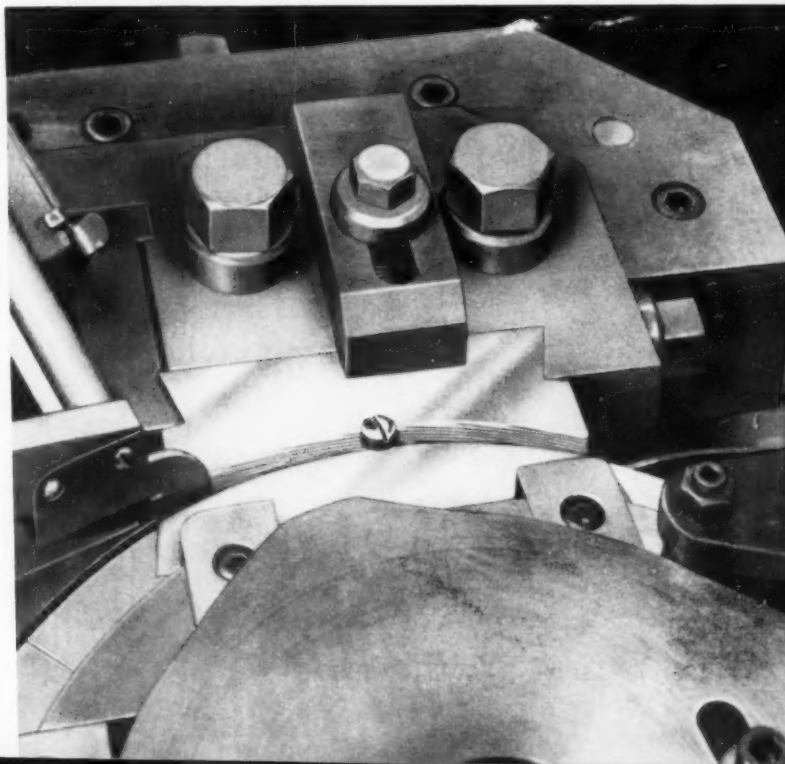
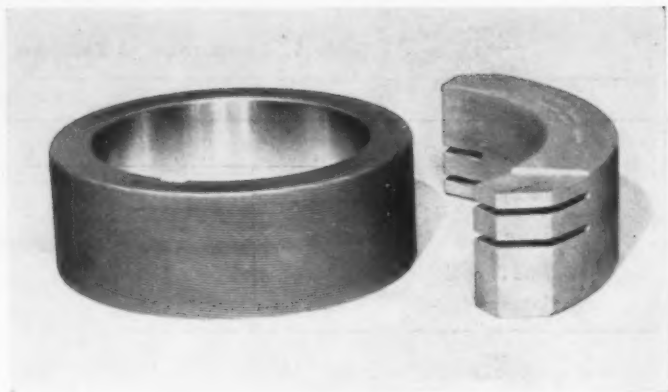


Fig. 6. Circular rotating die member and a stationary die segment for use on a planetary thread-rolling machine. Being solid, this circular die differs from the segmented type, shown in Fig. 5.



stationary concave segment located outside the main die member. A screw blank can be seen between a stationary die member and circular die of segmented design on a Prutton "Rollmaster" machine in Fig. 5.

The starting end of the stationary segment die is adjusted so that it and the rotary die will just contact the blank. Closer spacing is provided between the two members at the finishing end of the segment die so that the thread will be fully formed. No axial movement of the blank takes place during rolling. Rotary speed of the circular die can be varied to suit different types and hardnesses of material.

Either one or several blanks can be in engage-

ment with a single segment, such as the one shown next to a solid circular die in Fig. 6. Considering the fact that two or three segments can be installed around the same circular die, and that it is possible to roll up to 1600 blanks per minute per segment with an adequate feeding arrangement, it can be realized how many thousands of headed fasteners can be threaded each hour on one machine.

With a properly designed feed-cam the blank is accelerated to exact die speed at the time of entry. Since the dies are rigidly mounted and since the die speed is constant, there is no skidding of the blank being rolled after penetration has begun.

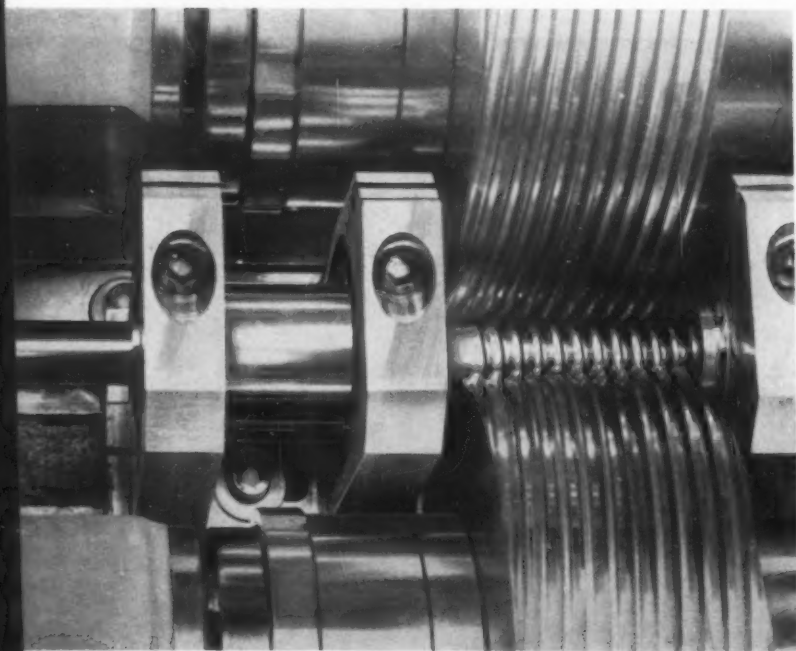


Fig. 7. Forming 3/4-6 left-hand Acme threads along a 20-foot steel bar on a cylindrical-die machine. Two horizontally opposed thread-rolling dies are used.

### ***Cylindrical-Die Machines Handle a Variety of Threading Operations***

In-feed, or plunge, rolling—with no axial movement of the blank—is a common application of cylindrical-die machines. Since the dies are circular in shape there are no limitations on the number of revolutions required to roll a thread or the rate at which the dies feed into the work.

There are two basic types of cylindrical-die machines available—those using two dies located diametrically opposite each other and those using three equally spaced dies. Both machine types can be adapted for axial feeding, or through-feed rolling. Short parts or long bar lengths (up to approximately 20 feet long) can be rolled. Three-die machines will accept either hollow or solid blanks.

In Fig. 7 can be seen a Landis Machine Co. "Lanhyrol" two-die machine rolling a 3/4-6 left-hand Acme thread along a 20-foot bar length of C1117 steel. The bar is being fed through the dies at a rate of 48 linear inches per minute, and the threads are held within 0.001 inch on the pitch diameter throughout the entire length. More than 59,000 feet of threaded bar have been produced with a single pair of dies.

Both dies are mounted on parallel, horizontal, power-driven spindles. The left-hand die and spindle rotate in a stationary bearing support. The right-hand die and spindle unit rotates in a

bearing support housing capable of moving in a horizontal plane. Retraction of the right-hand die facilitates loading and unloading of the machine.

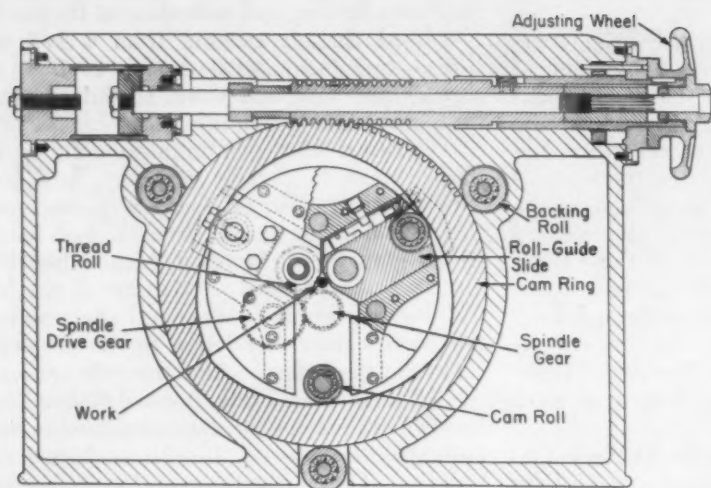
Unified threads ranging from 4 1/2 to 32 threads per inch, Acme threads of 6 or more threads per inch, and worm threads equivalent to 8 diametral pitch and finer can be rolled under normal conditions on this two-die machine. Coarse pitch limitations will vary, however, as they are dependent on the flow characteristics, elongation value, tensile strength, and hardness of the work-piece. Finished thread diameter, in any case, is controlled by the size of the blank, the distance between dies, and the position of the blank center in relation to the die centers.

On the three-die machine the rolls are equally spaced around the blank. A Reed Rolled Thread Die Co. machine of this type, designed to handle in-feed work up to 4 3/4 inches in diameter, can be seen in Fig. 8. The thread is formed while the blank floats between the dies. All three dies actually support the work-piece and hold it rigidly—no additional support (except when through-feeding bar lengths) is necessary.

Cylindrical-die machines are available in both vertical and horizontal (illustrated) models. The vertical machine is sometimes preferred for general purpose use as many parts are held down against locating stops by their own weight, with no auxiliary clamping or work-supporting fixtures being required. Horizontal machines are recom-

**Fig. 8. A horizontal three-die machine is being used for in-feed thread-rolling. Class 5 threads are formed on heat-treated steel blanks for 1 5/8-inch diameter studs.**





**Fig. 9.** Functioning members in the working head of a horizontal three-die machine. Rotation of the cam-ring feeds the thread-rolling dies into the work blank.

mended for long and heavy work and may be adapted to both in-feed and through-feed rolling.

A section taken through the working head of a National Acme Co. three-die machine is shown in Fig. 9. This machine is designed primarily for threading standard, solid, or hollow parts ranging in diameter up to 1 1/2 inches.

Advancement and retraction of the roll-guide slides carrying the three thread-rolls are provided by a cam-ring that encircles the die-head mechanism. The cam-ring is supported by three backing rolls. Cam-rolls on the roll-guide slides are held in contact with the cam-ring by spring plungers. Anti-friction bearings are located on the spindle ends of the slides. the outer races of

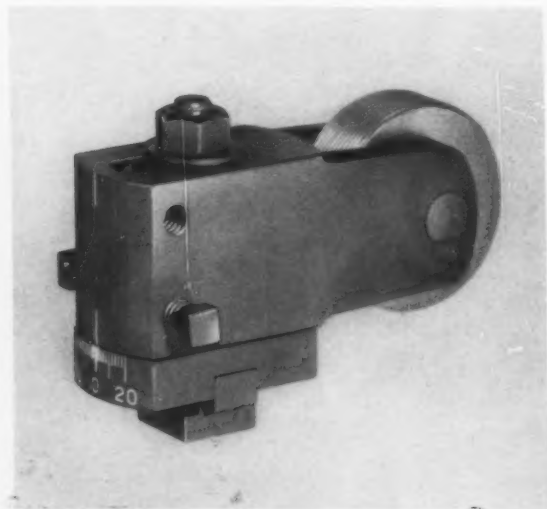
these bearings are nonrotating and bear against the ends of the slides. Studs passing through the inner races support the thread-roll spindles.

#### ***Attachments Permit Thread-Rolling without Special Machines***

Rolled threads are generated on automatic screw machines and turret lathes with in-feed attachments using one or two thread rolls, or self-opening three-die heads for end feeding. Holders for in-feed rolling with a single roll, such as the Reed attachment shown in Fig. 10, ordinarily apply rolling pressure on a blank radially, with the roll feeding directly toward the center of the work, left, Fig. 11. Thread size is governed by the final cross-slide position.

When using a two-roll attachment for tangential in-feed rolling, center, Fig. 11, the cross-slide is used only as a means of feeding. The thread is formed between the two rolls as they straddle the blank, Fig. 12—final thread size being obtained when the rolls reach the center of the work. Finished thread size is controlled by the fixed setting of the rolls in the attachment.

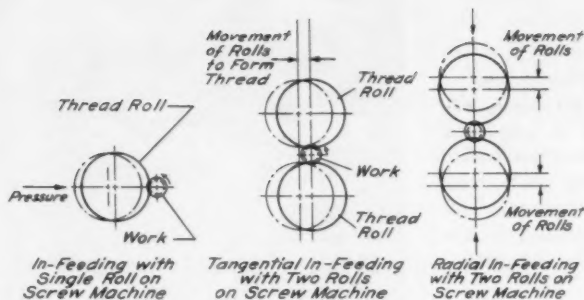
Some attachments provide their own radial in-feed. These usually have two opposed rolls that form the thread by radial in-feed after the rolls have been positioned at the center of the blank



**Fig. 10.** Single-roll threading attachment for use on lathes and automatic screw machines. This unit feeds in radially toward the center of the work.



Fig. 11. Three in-feeding methods used with one- and two-roll threading attachments. The single-roll unit, left, directs threading pressure against the work and the machine spindle.



by the cross-slide, right, Fig. 11. Final thread size is obtained when the rolls have reached their full radial in-feed travel.

Thread-rolling attachments can also be used on standard lathes. In this case, however, an auxiliary source of power feed is required. A typical hydraulic-power feed unit is shown supporting a Sheffield-Murchey two-roll attachment on the cross-slide of a turret lathe in Fig. 13. Although the base of the feed unit is bolted to the machine cross-slide, the thread-rolling head is mounted on a sub-slide.

After the blank diameter has been turned, the cross-slide and the sub-slide are positioned against a stop. Threading cycle is started by pressing a button at a separate control station. The thread-rolling attachment feeds toward the center at a rate of 0.010 inch per revolution, contacts the work, forms the thread, and returns rapidly. When rolling threads on a lathe, the cross-slide should be quickly retracted from the work-piece when the power feed is disengaged. Excessive dwell will cause stripped threads or damaged rolls due to the nut action between the rolls and the threaded work-piece.

Tapered threads can also be formed with thread-rolling attachments. The method varies slightly depending on the manufacturer of the units. Some attachments accept rolls that are appropriately tapered and that just slip in place on the roll pins. Other attachments make use of parallel-sided rolls. These are mounted on roll pins that are set out-of-parallel to the required degree of taper.

Fig. 12. Tangential in-feed rolling with a two-roll attachment. The thread form is completed when the two rolls are in line with center of work-piece.

An Acme-Fette three-roll attachment can be seen in Fig. 14. This is a self-opening, end-feeding unit that can be used for rolling parallel thread forms only. The rolls are mounted in the head on needle bearings around eccentric studs. At the desired thread length, the head opens in a manner similar to a pull-off type die-head—a spring mechanism rotating the eccentric studs to swing the rolls away from the work.

The head is tripped by stopping its forward travel, either by an outside stop or a special inside trip. It is reset by a handle or yoke that reverses movement of the eccentric studs and brings the rolls back into threading position. These three-roll heads can be used in applications where either they or the work-piece rotate.

No lead-screw is required. After two or three roll threads have engaged the work they maintain their own lead. Rolling must be completed in one pass. Due to surface concentration and

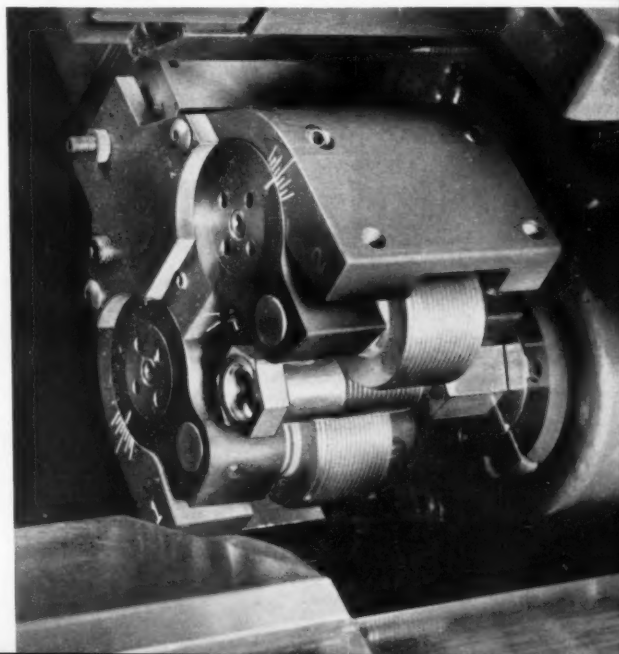
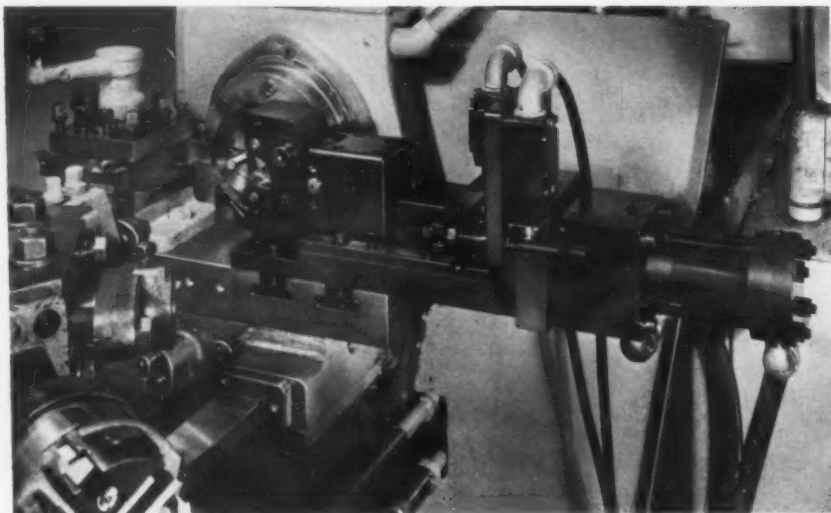


Fig. 13. When a one- or two-roll threading attachment is employed on a conventional lathe, an auxiliary power feed unit is required. The unit illustrated is hydraulically actuated.



work hardening in a rolled thread, a second pass would damage the rolls. For best results with standard rolls, the work-piece material should be no harder than 32 Rockwell C.

#### ***Production Requirements Demand Varied Feeding Techniques***

Perhaps the most commonly used method of forcing penetration of the thread form into the blank is by in-feed, or plunge, rolling. On a reciprocating type machine the in-feed effect, or rate of penetration, is designed into the faces of the flat dies. On a cylindrical-die machine, such as the two-die Lanthrol unit shown in Fig. 15, in-feed is provided by advancement of the right-

hand roll to a predetermined distance from the left-hand roll (minor thread diameter).

In the illustrated example of in-feed rolling, the blanks are directed from a hopper, into a feed chute, then to an automatic indexing work-rest. The work-rest cage, which encases the left-hand roll, indexes the bolts into or away from the rolling position. Movement of the spindle unit is automatically controlled by rolling and loading timers.

An example of in-feed rolling on a vertical three-die machine is shown in Fig. 16. Here, thin-wall spark plug shells (with the electrode welded in place) are hopper-fed to the loading and unloading position of the Reed machine. Positioning of the shells between the dies and

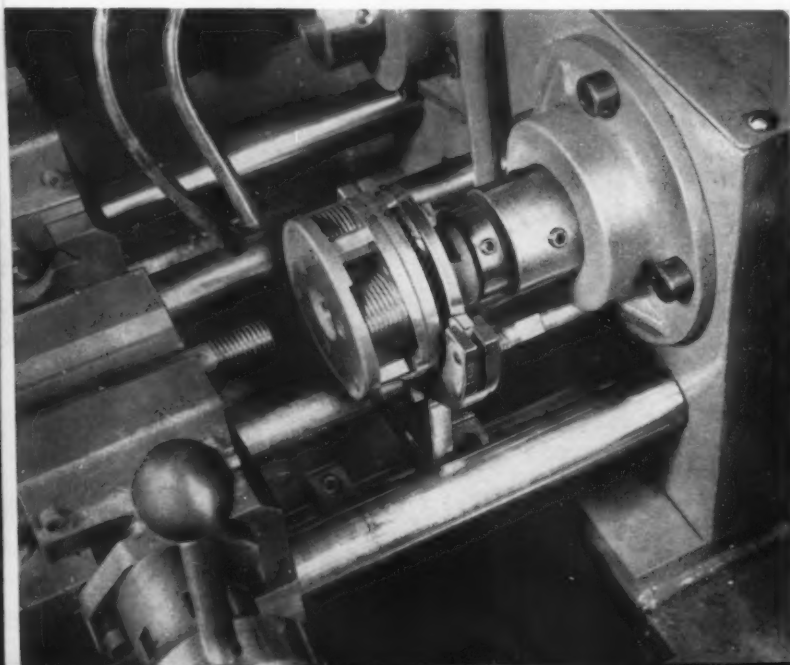


Fig. 14. Three-roll threading attachment is a self-opening, end-feeding unit similar to a pull-off type die-head. After engagement with the work, the rolls maintain their lead.

removal after threading are completely automatic. The production rate for this operation is fifty pieces per minute.

Continuous rolling is applied to the planetary and two-die cylindrical machines only. It yields the highest rates of production.

Some two-die machines must be specially set up for this type of operation. The work-pieces are hopper-fed to a revolving automatic work-rest that indexes them into and away from the rolling position. Two cam type segmented cylindrical dies are used. They are set at a predetermined distance from each other and remain in that position during the operation. Indexing is timed to correspond to arrival of the relieved sections of the dies at the rolling position. By this token, one, two, or three work-pieces are threaded during each revolution of the dies.

The Sheffield-Murphy Precision-Rol machine illustrated in Fig. 17 is specifically designed for continuous rolling. Solid dies are used in place of segmented dies. This is possible because the two dies rotate at different speeds. Although this action causes slightly uneven wear, it is compensated for by interchanging the dies on the spindles.

In operation, blanks *E* are fed between the dies *F* by a work-feeding ring *G*. The feeding ring rotates at half the difference of the roll speeds. After being threaded, the parts drop into an ejection chute *H*. A knob is provided for ad-

justing the position of the fixed spindle to correct for or to yield any taper.

High-production threading of studs can be handled by continuous rolling. Threads of different diameter, pitch, and tolerance, as well as those of identical specifications, can be produced in a single pass through the machine. For this type of operation, two dies are used on each spindle and are maintained at a fixed distance apart.

An example of through-feed rolling is shown in the heading illustration, where a 1 3/4-4 Acme thread is being formed along the length of a 24-foot bar on a Reed three-die machine. The material is 4340 Chromoly steel having a pre-rolled hardness of 32 Rockwell C. To eliminate bar whip, it is supported in a feed tube.

Dies used for through-feeding are provided with a throat area for progressive generation of the thread. They are maintained at a predetermined fixed distance apart during forming. The dies provide a self-leading action as the threads are formed.

Reciprocal rolling is still another method of thread forming. It is used to produce large-diameter, coarse-pitch threads such as worms.

In this process, the right-hand roll unit is retracted for loading. Normally, the work-piece is placed in a manually operated work-holding fixture. When the machine cycle is started, the right-hand roll advances and begins penetration.

Fig. 15. In-feed, or plunge, rolling on a two-roll, cylindrical-die machine. As each blank is directed from the down-chute to the threading position, the right-hand roll is fed into it.

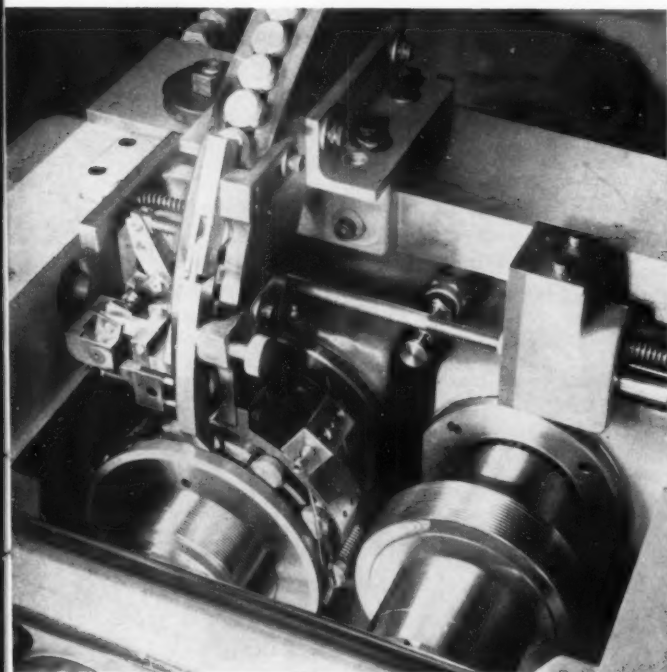
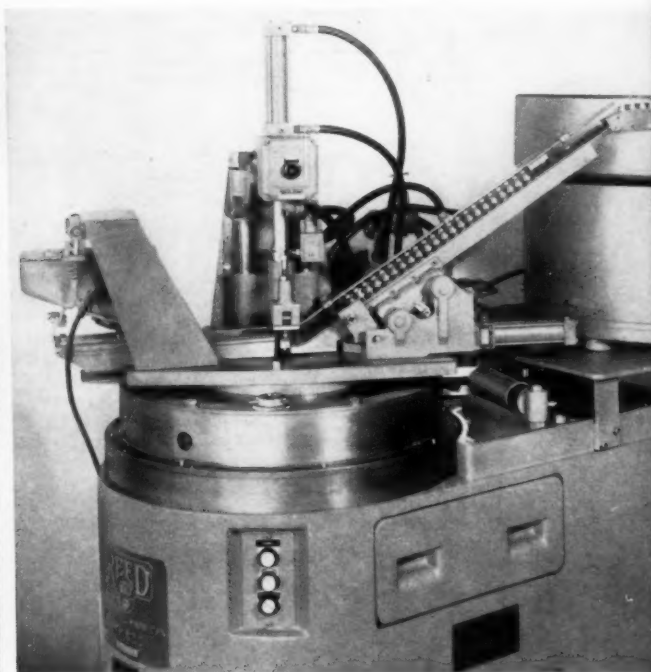
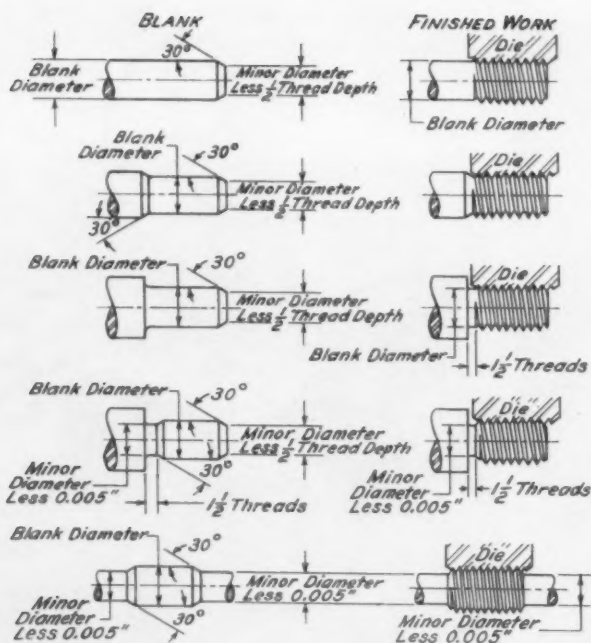
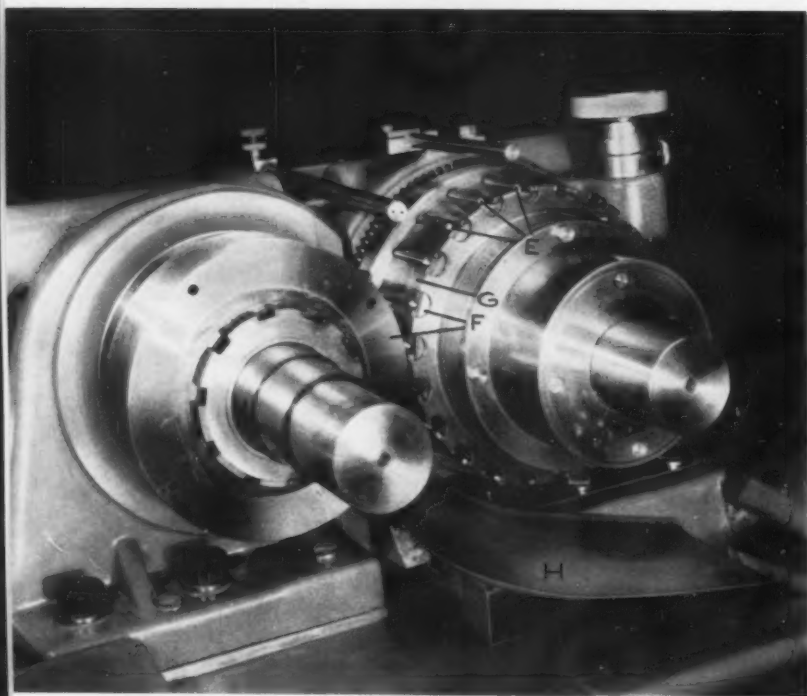


Fig. 16. Feeding of this vertical three-die machine is completely automatic. Threads are being rolled on thin-wall spark plug shells after the electrode has been welded in place.







**Table 2. Approximate Production Rates of Thread-Rolling Machines\***

| Diameter of Threads, Inches | Type of Machine |               |                   |
|-----------------------------|-----------------|---------------|-------------------|
|                             | Planetary       | Reciprocating | Cylindrical Die † |
| 1/8                         | 400-1600        | 30-250        | 21-100            |
| 1/4                         | 400-1200        | 60-125        | 21-90             |
| 1/2                         | 150             | 60-80         | 26-70             |
| 3/4                         | ...             | 40-60         | 21-40             |
| 1                           | ...             | 30            | 16-25             |
| 2                           | ...             | ...           | 6-16              |
| 3                           | ...             | ...           | 4                 |
| 4                           | ...             | ...           | 4                 |

\* In-feed rolling of soft steel. Pieces per minute. It should be emphasized that all production rates set forth in this table are approximately what the user can expect to obtain.

† It can be pointed out that some cylindrical die machines are currently rolling 3/8"-16 threads at a rate of 132 per minute, and 5/8"-18 and 3/4"-10 threads at a rate of 80 per minute.

**Table 3. Determining Approximate Minimum Blank Diameter**

| Material   | Hardness         | Per Cent of Pitch Diameter Tolerance* |
|--|------------------|---------------------------------------|
| Aluminum alloy .....                             | Soft             | 30-50                                 |
| Brass and bronze .....                           | Hard             | 20-40                                 |
| Steel:   | ...              | 20-40                                 |
| 10-15 Carbon .....                               | Soft             | 0-20                                  |
| 30-50 Carbon .....                               | Soft             | 20-40                                 |
| 30-50 Carbon or alloy ..                         | 15-25 Rockwell C | 30-50                                 |
| 30-50 Carbon or alloy ..                         | 26-32 Rockwell C | 40-60                                 |
| 30-50 Carbon or alloy ..                         | 33-40 Rockwell C | 50-70                                 |
| Stainless, chrome-nickel alloy (300 Series) .... | ...              | 60-80                                 |
| Stainless, chrome-alloy (400 Series) .....       | ...              | 40-60                                 |

\* Used to determine the amount to be added to minimum pitch diameter.

However, full thread depth is not reached in one revolution of the blank.

As the right-hand rolling advances, the work-piece moves endwise because of the self-leading action between the dies and the partially formed threads. To permit this movement, the work-holding fixture operates in a slide. It also pivots to allow the work-piece to move toward the left-hand die as penetration progresses.

When the fixture has moved a predetermined distance, the direction of die rotation is reversed.

The work-piece and fixture then return to their original position as they move endwise in the opposite direction. This cycle is repeated until the required thread depth is obtained.

### ***Production Rates Depend on the Method Used***

Rates of production will vary with the nature of the work, hardness and kind of material being worked, and type of equipment used. The harder

**Table 4. Approximate Blank Diameter Tolerances\***

| Work Tolerances, Inches |                | Thread Diameters, Inches |          |            |            |            |            |
|-------------------------|----------------|--------------------------|----------|------------|------------|------------|------------|
| Major Diameter          | Pitch Diameter | Up to 1/2                | 1/2 to 1 | 1 to 1 1/2 | 1 1/2 to 2 | 2 to 2 1/2 | 2 1/2 to 5 |
| 0.002                   | 0.001          | 0.0003                   | 0.00025  | 0.0002     | .....      | .....      | .....      |
| 0.003                   | 0.0015         | 0.0005                   | 0.0004   | 0.0003     | .....      | .....      | .....      |
| 0.004                   | 0.002          | 0.0007                   | 0.0007   | 0.0006     | 0.0005     | .....      | .....      |
| 0.006                   | 0.003          | 0.0010                   | 0.0010   | 0.0010     | 0.0008     | 0.0006     | .....      |
| 0.008                   | 0.004          | 0.0013                   | 0.0013   | 0.0013     | 0.0010     | 0.0010     | .....      |
| 0.010                   | 0.005          | 0.0015                   | 0.0017   | 0.0017     | 0.0015     | 0.0015     | 0.0010     |
| 0.012                   | 0.006          | 0.0020                   | 0.0020   | 0.0020     | 0.0020     | 0.0015     | 0.0015     |
| 0.014                   | 0.007          | 0.0023                   | 0.0023   | 0.0023     | 0.0023     | 0.0023     | 0.0020     |
| 0.016                   | 0.008          | 0.0025                   | 0.0025   | 0.0025     | 0.0025     | 0.0025     | 0.0025     |
| 0.018                   | 0.009          | .....                    | 0.0025   | 0.0030     | 0.0030     | 0.0030     | 0.0030     |
| 0.020                   | 0.010          | .....                    | 0.0030   | 0.0030     | 0.0035     | 0.0035     | 0.0035     |
| 0.022                   | 0.011          | .....                    | 0.0030   | 0.0035     | 0.0035     | 0.0040     | 0.0040     |
| 0.025                   | 0.012          | .....                    | .....    | 0.0035     | 0.0040     | 0.0040     | 0.0040     |
| 0.030                   | 0.014          | .....                    | .....    | .....      | 0.0040     | 0.0040     | 0.0040     |
| 0.035                   | 0.016          | .....                    | .....    | .....      | 0.0040     | 0.0040     | 0.0040     |

\* These tolerances are used to obtain the maximum blank diameters and should be added to the minimum blank diameters obtained from Table 3. Where the major diameter tolerance is less than twice the pitch diameter tolerance, always use the blank diameter tolerance opposite to the nearest major diameter tolerance shown in the table; otherwise refer to the pitch diameter tolerances only.

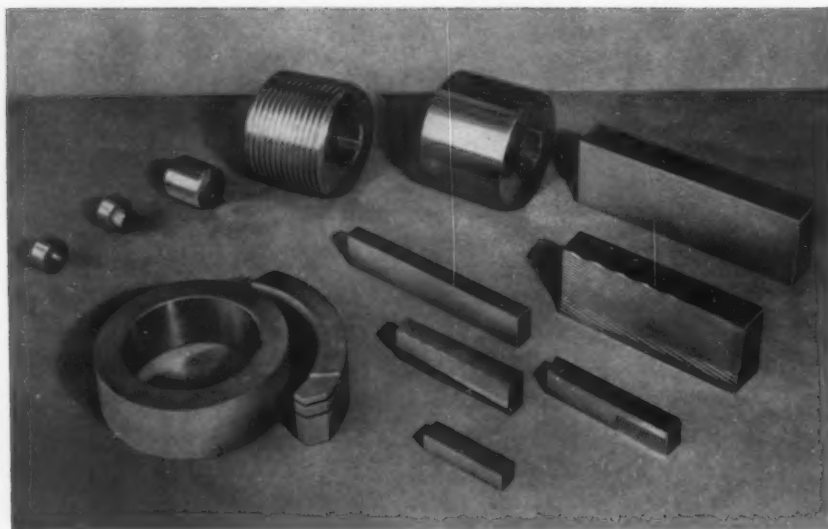


Fig. 19. Some of the many types of thread-rolling dies being used. Included are flat dies, cylindrical dies and attachment rolls, and a circular die and segment for a planetary machine.

the blank the slower the process. Production rates for different types of thread-rolling machines are compared in Table 2.

On a reciprocating thread-rolling machine the shape of the flat die face determines the amount of die penetration for each revolution of the blank. The penetration rate is usually much greater at the beginning of the rolling stroke than at the end.

With cylindrical-die machines the rate of penetration is controlled by the amount of feed applied to the dies during each revolution of the blank. Total die penetration per blank revolution varies with different machines, kinds of work, and types of hardnesses and materials rolled. High die speeds are used for rolling harder materials in order to reduce the rate of penetration and still maintain production output.

When using a single-roll threading attachment, pressure is usually directed against the work blank and the machine spindle. With a two-roll attachment, this pressure is reduced to approximately 15 per cent of that exerted by a single-roll unit.

It is desirable to roll threads on screw machines and turret lathes in as few revolutions as possible. With two rolls, between ten and thirty-five revolutions of the blank are common practice. A small penetration rate is advisable for single-roll attachments unless the work is rigid.

## Blank Size is of Major Importance

Since rolling does not remove metal, but displaces it, it is necessary that the blank contains no more than the correct amount of material to

form the finished thread. Should too much material be provided, the dies will become overloaded; should too little material be provided, the thread will be incompletely formed.

Thread volume above the pitch diameter of an American Standard thread form (when thread depth equals twice the addendum) very nearly equals the volume of material displaced. It therefore becomes apparent that the blank diameter approximates the pitch diameter of the finished thread. This holds true in the case of similar threads having a balanced thread form. In general, blank diameters should be less than the maximum pitch diameter of the thread, and tolerances on the blank diameter should be as small as practical.

Suggested diameters for in-feed rolling of solid blanks can be obtained by referring to Tables 3 and 4. These tables cover American Standard threads (where thread depth equals twice the addendum) that are at least one diameter long up to 1 inch in diameter, and not less than 1 inch in length for diameters over 1 inch.

Minimum blank diameters for various materials can be calculated by adding the appropriate percentage of pitch diameter tolerance listed in Table 3 to the minimum pitch diameter of the thread to be rolled. Maximum blank diameters are arrived at by adding the blank diameter tolerance selected from Table 4 to the minimum blank diameter calculated from Table 3. For shorter thread lengths, larger percentages than those listed in Table 3 are used. This is to compensate for endwise stretching of the blanks during rolling.

Some recommended blank designs for rolling

threads in various locations are shown in Fig. 18. Chipping of the thread form on the dies is minimized by beveling the ends of the blanks. A bevel having an included angle of 60 degrees, 30 degrees from the axis of the blank, is suitable in most cases.

The smaller bevel diameter should be less than the minor thread diameter. During rolling, the end threads are forced outward so that the bevel on the finished thread is closer to 45 degrees than it is to 30 degrees. In the case of the harder materials, even smaller starting bevels are preferred.

### ***Rolls and Dies for Thread-Rolling***

Under ordinary conditions, each thread diameter and pitch requires a specific set of dies or rolls designed especially for the individual application. The same dies or rolls are not used for different diameters of the same pitch. Some of the many types of flat dies, planetary dies, and thread rolls for both cylindrical-die machines and attachments are shown in Fig. 19.

For accurate threading, dies must have accurate thread form and lead and straight pitch lines. In the case of flat dies, reliefs at the ends of the stationary die should be parallel with the axis of the work blank. The thread form on the relieved portions should be correctly blended with the threads on the die. This allows the blank to roll freely along the entire length of the die.

Face width of a die or thread roll is important. Proper face width and correct die bevels not only prevent chipping of the end die threads or in-process breakage, but also determine the number of settings possible for rolling on the face of the die. Width of the die face for in-feed rolling must be greater than the thread length being formed.

For through-feed rolling, the dies are designed for the job at hand—the width and design of the die face should be determined by the die manufacturer. When rolling next to a shoulder with through-feed dies, the shoulder on the work is usually fed away from the die. Three to five leads of the thread should be allowed for the dies to reach full thread depth.

Thread-rolling dies may be selected for single, double, or multiple settings. A pair of dies chosen for single-setting use is shown at left in Fig. 20. When used for double setting, right, the edges of the dies are repositioned so that the unused

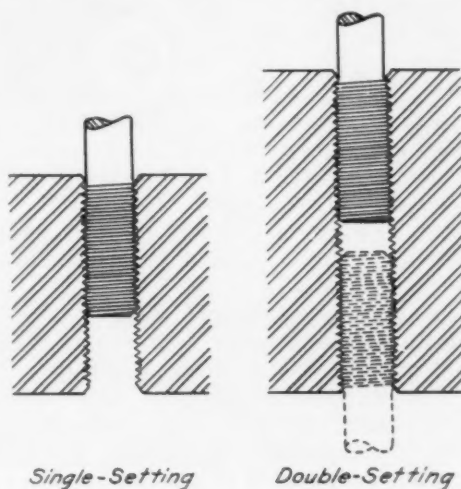
portion of the die face is available. For multiple settings, the condition is basically the same as for double-settings except that the die faces are at least four times as wide as the thread length to be rolled. After being used in two settings as just described, the worn thread form is removed. The center threaded area is then used as an additional double-setting die.

On reciprocating thread-rolling machines both single- and duplex-face flat dies are used. The single-face dies have a thread form on only one side of the die, while duplex-face dies have a thread form on both sides. It is common practice to roll on both sides by reversing the die faces, and also to use double settings on each face—making a grand total of four available settings on one pair of dies.

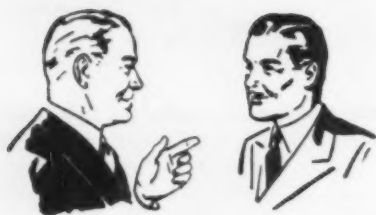
Dies for gimlet-point screws are an exception. They are made for single settings only and are always single-faced. The rise on the die face that rolls the gimlet point prohibits use of duplex dies and also prevents use of double settings.

### ***ACKNOWLEDGEMENTS***

We wish to thank the following companies for their generous assistance in providing the information contained in this Reference Section: Hartford Special Machinery Co., Hartford, Conn.; Landis Machine Co., Waynesboro, Pa.; National Acme Co., Cleveland, Ohio; Prutton Corporation, Cleveland, Ohio; Reed Rolled Thread Die Co., Worcester, Mass.; and Murchey Division, Sheffield Corporation, Dayton, Ohio.



**Fig. 20.** Dies can be selected to provide single, double, or multiple settings. When mating edges of a double-setting die become worn, the dies are reversed and the opposite edges used.



# Talking With Sales Managers

BERNARD LESTER  
Management Consulting Engineer

## What Did that Meeting Accomplish?

**H**E is tied up in conference." This cliché raises the question of whether meeting time is well spent, or whether it displaces concentrated thought and responsible decision by the sales executive.

Corporate growth and work specialization have caused a greater need for coordination and co-operation instead of self-sufficiency. Though "selling" a person what to do has largely replaced telling him, there is one further step. It is consulting. This recognition of the individual has become increasingly more important since automation has been applied to all sorts of operations.

In spite of the necessity for greater consultation, we believe that the office meeting habit has frequently grown until it impairs initiative and responsibility and becomes too time-consuming.

The meeting surely has its place. It has become a necessary tool of management and employee. It can profitably investigate problems. Men brought together may interchange ideas, gain inspiration, and develop good relations. Often differences of opinion can be resolved. Another value of a meeting, often overlooked, is the opportunity offered the sales manager to study individual traits. Knowledge, leadership, alertness, judgment, and especially patience are characteristics to note.

But meetings—especially those called at random—have several limitations that arise from the fear of leaving someone out. Some personality may monopolize the discussion. Politics and compromise easily creep in when discussions depend on the majority vote. Worst of all, a meeting can provide an escape from independent thinking and decision making.

Someone says, "Let's get together to thrash the matter out and decide," and another meeting is under way. Freedom of opinion and expression are essential. We all know progress depends on fresh ideas, but authority and decision must be by a few! Two heads are not always better than one. Someone has said that a three-person conference is best if two of the people are absent.

Recall a few office meetings and size up the

net result of each. Had the meeting a suitable purpose? Was it well planned? Conducted? Concluded? What was its cost including overhead?

Re-examine the purpose of the proposed business meeting. Doing so helps decide whether it should be called. These questions are pertinent:

Is my purpose for calling this meeting valid?  
Have I thought out the subject free from prejudice?

What facts are needed for intelligent and careful discussion?

Where may the results of this meeting lead?

What are the who, when, and where of the proposed meeting?

With the purpose defined and arrangements made, the agenda should be considered. The greatest waste of time follows a poorly devised agenda and the lack of necessary facts. Repeatedly, meetings are adjourned because essential statistics are unavailable.

Purposeful meetings often fail because of poor leadership. Firm, tactful control aims to keep the meeting moving toward a goal; to encourage participation, but prevent monopolization; to summarize progress from time to time so that all are conscious of the attainment; and to make the conclusions crystal clear.

Each of us has attended a poorly led meeting. We have lost interest from extraneous discussions or have been stopped in an attempt to speak. The chairman may have been abrupt and tactless. His leniency and indecision may have marked him as no leader at all. Morale was destroyed. After the meeting, arguments started as to how to interpret the conclusions.

If you have not recently taken an inventory of your meeting and conference habits, do so now. You may discover ways to recover wasted time, fix responsibility, and develop that prized attribute of leadership—the ability to decide promptly and wisely. More than this, you may find better ways to make meetings an instrument to inspire men and lead them. By so doing you may take one more step forward in becoming a top notch sales manager!



Tools and fixtures of unusual design and time- and labor-saving methods that have been found useful by men engaged in tool design and shop work

## Jaw Thread Sections Formed on Lathe

JOSE C. SOBKOWIAK, Jackson, Mich.

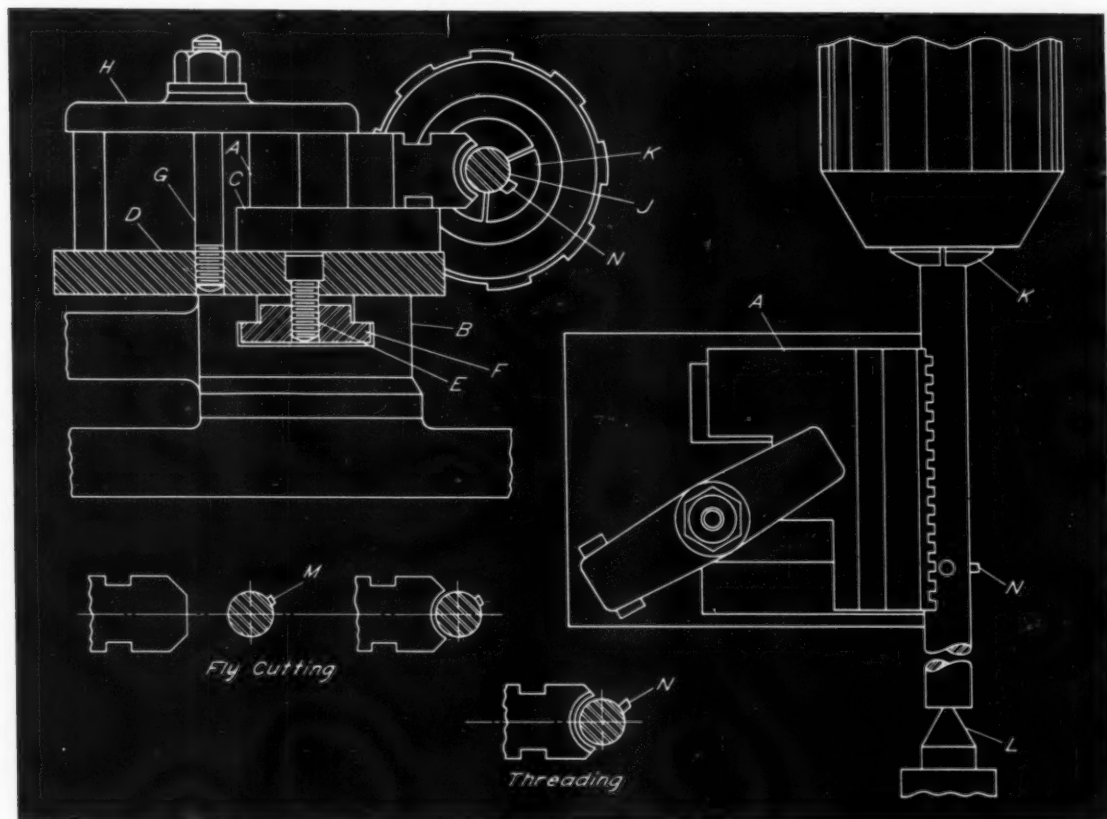
The back of each jaw of an independent chuck has the form of a nut section which engages a threaded spindle. Turning the spindle adjusts the jaw radially in the chuck body. It is possible to obtain the thread form of the jaw in a lathe operation, as shown in the illustration.

Chuck jaw *A* is supported over compound rest *B* and is raised to the machine center line by filler block *C* and baseplate *D*. The baseplate

is drilled and counterbored to retain cap-screw *E* which engages toolpost T-nut *F*. To hold the jaw in place, a tapped hole in the baseplate receives stud *G* running through clamp *H*.

The work surface of the jaw is indicated and set parallel to the machine spindle. This is done by swiveling the compound rest in the required direction.

Machining is performed with boring-bar *J* held



The back jaw form is obtained by fly cutting and single-point threading with cutter held in a boring-bar and driven by the lathe spindle.

in spindle collet K. The bar must be at least twice the length of the work surface and is supported at its outer end from tailstock center L. First the surface is made concave, with a radius corresponding to the minor diameter of the thread, by fly cutter M. Then this cutter is removed, and the thread is single-pointed with form cutter N.

For the fly cutting, the carriage longitudinal feed is used. Correct radius is obtained by ex-

tending the cutter an amount equal to the thread depth. This can be checked with a micrometer. For example, if the bar is 0.625 inch in diameter and the minor diameter is 0.875 inch, the micrometer reading across the bar to the cutter tip should be 0.75 inch. The thread illustrated is square, so the form cutter is ground to the correct pitch, and the lead-screw of the lathe is used for the single-pointing.

## Air Indexing Fixture

G. F. GROSCHKE, Schenectady, N. Y.

A dividing head type fixture combines the accuracy of indexing-pin engagement and the speed of air actuation. It was developed principally for work where weight and angular location are important factors. The entire operation is directed from a single control lever.

Design features are illustrated in Fig. 1. Index-pin lever A is shown in solid outline (position I) when the pin proper is engaged in one of the holes of index-plate B. When the lever is pivoted to the left as shown in broken outline (position II), the pin is withdrawn from the plate and the stem of the lever reverses two-way valve C, directing air to double-acting cylinder D. Rod E, connected to a piston in the cylinder, thus strokes to the right.

Carried by the rod is sliding key F, cut at a

45-degree angle at each end. When the rod is retracted to the left, a tension spring keeps the key normally raised, as shown in solid outline (position III) where it half enters one of the notches in wheel G. This wheel and index-plate B are secured to a common shaft and rotate as a unit. As the rod strokes to the right, the key causes the wheel to rotate and the notch, in turn, encloses the end of the key, forcing the key to fall in its slide.

When the leading side of the notch is perpendicular, the lower end of the key abuts inclined stop-block H (position IV), and rotation of the wheel is arrested. Lever A is then pivoted to position I and its index-pin engages the next hole in the plate. This movement of the lever again reverses valve C, retracting rod E to the

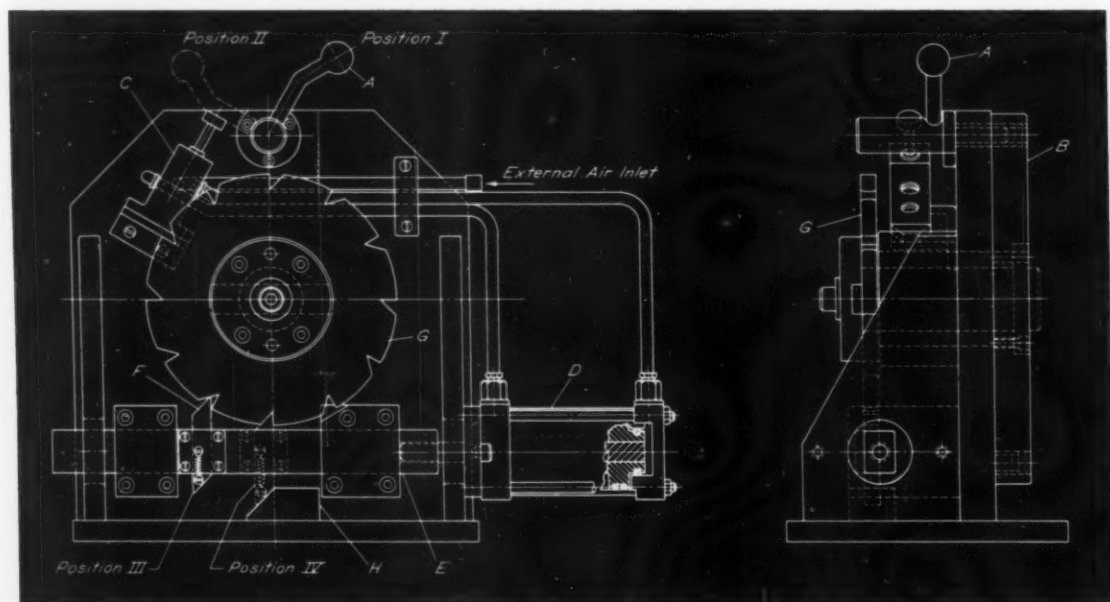


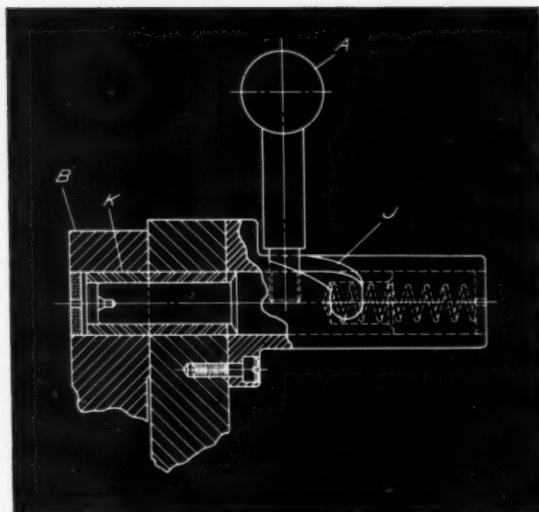
Fig. 1. When lever (A) is pivoted from position I to II, key (F) moves transversely from position III to IV.

Fig. 2. Like the bolt action of a rifle, pin (K) moves in or out of index plate (B) when lever (A) is pivoted.

left and letting key *F* spring up to half enter the next notch (position III). The indexing cycle is now complete, with the fixture locked for machining.

Wheel *G* can be designed with an odd or even number of equally spaced notches, according to the required number of work divisions. The wheel and the index-plate are related radially to each other so that when the key is in position IV, a hole in the index-plate is aligned with the index-pin. Actually, if the device is constructed precisely and stop-block *H* positioned correctly, repetitive indexing can be held to within 0.001 inch accuracy without engagement of the index-pin. With positive index-pin engagement, accuracy is even greater.

The design of the index-pin is illustrated in Fig. 2. Its movement is similar to the bolt action mechanism in a rifle. A spiral wringing motion of the lever in cam-slot *J* provides easy entry and withdrawal of the index-pin *K* from index-plate *B*. Since the assembly is spring-loaded, the



pin when engaged is secured in place against slippage from machine vibrations. The design of the cam-slot permits the pin to be locked when withdrawn if it is desired to give a free movement to the indexing head.

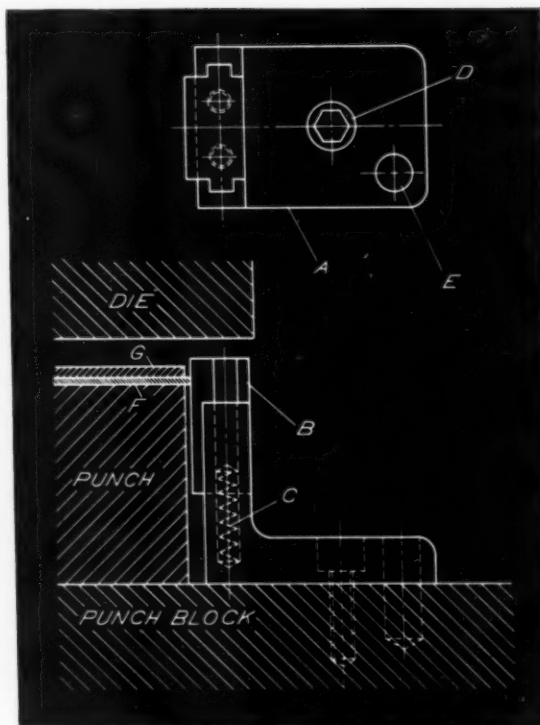
## Retracting Stock Stop with Renewable Slide

FRANK L. RUSH, Woodbourne, N. Y.

A telescoping stock stop that has provision for easy replacement of worn surfaces is here illustrated. When no longer suitable for accurately positioning the blanks, the slide can readily be changed with the body of the stop remaining secured to the die. Hardened slides can be made up in advance. Also, the upper member of the die does not have to be notched for clearing this stop.

Base *A* is milled out to provide a groove on each inner side of the upright portion. Then tongues are machined into each side of the sliding stop *B*. These are to be a snug sliding fit in the milled grooves of base *A*. Springs *C* are placed between the body and the sliding stop. Base *A* is rigidly held on the die by a socket-head cap-screw *D* and a dowel pin *E*.

In operation, the sliding stop *B* rises with the ascending press ram to the required position in the die. The work-piece and the stripper plate are shown at *F* and *G* respectively.



Sliding stock stop (B) is easily replaceable when worn. Also, die does not have to be notched to clear stop.

# LATEST DEVELOPMENTS

**Machine tools, unit mechanisms, machine parts and**

## **Snyder Trunnion Type Special Machine for Processing Four Different Groups of Parts**

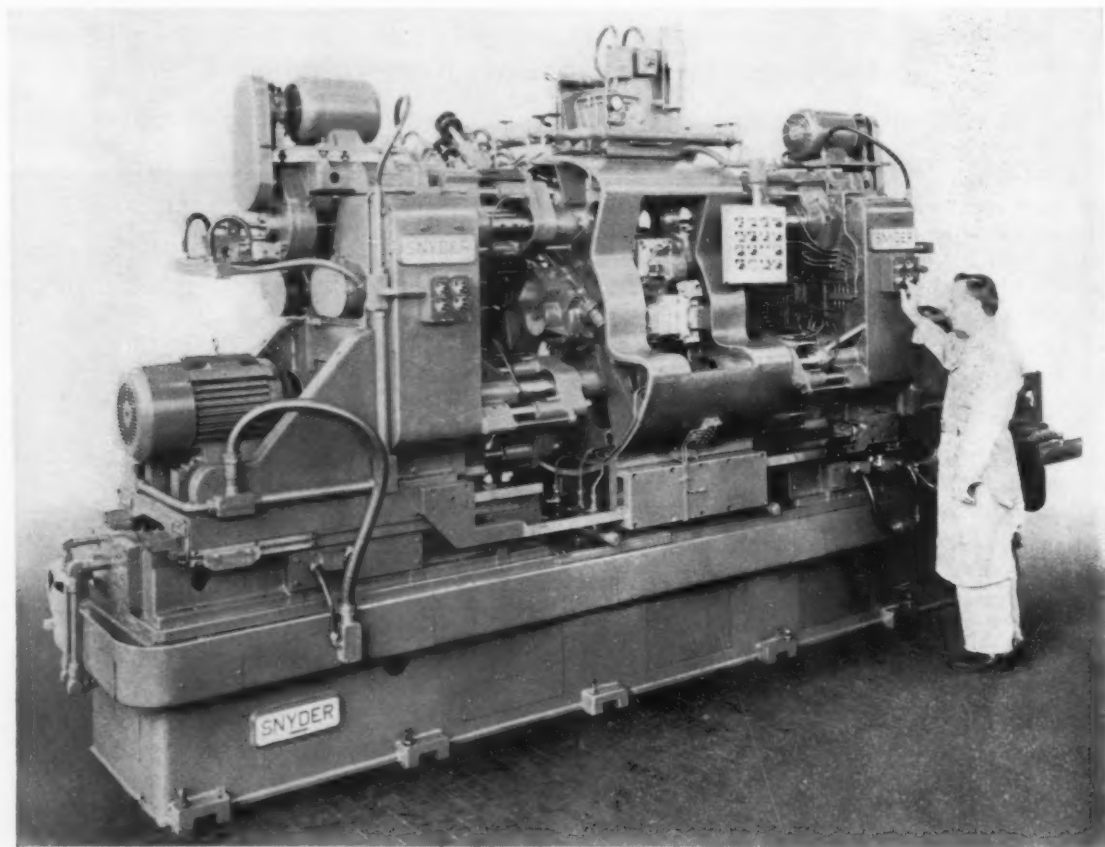
Versatility and adaptability are outstanding features of a semi-automated two-way, five-station, trunnion type machine designed and built by the Snyder Tool & Engineering Co., Detroit, Mich. This special machine drills, core-drills, reams, and taps four different groups of more than fifty-eight coal-mining machine rock-bit holder parts. It has work-fixtures mounted on a trunnion that is indexed to five positions between opposed, standard way type machining units. One machining unit

has a nine-spindle head and a single-spindle lead-screw tapping unit and the other has a ten-spindle head and a single-spindle lead-screw tapping unit. Holes up to 1 1/2 inches in diameter are drilled and reamed in the parts.

The variations in the four groups of steel parts processed by the machine are found in their size and shape, number of holes, hole locations, and hole sizes. The part size and shape variations are accommodated by interchangeable fixture details. The variation

in hole numbers is handled by utilizing two-position fixtures. A part is put in one fixture position and indexed through four machining stations, then put in the other position and indexed through four more machining stations. Some machining stations remain idle in the case of certain parts.

Variations in hole locations are provided for by three removable, interchangeable, two-spindle heads on each of the main heads of the machine. The heads are interchanged to accommodate prop-



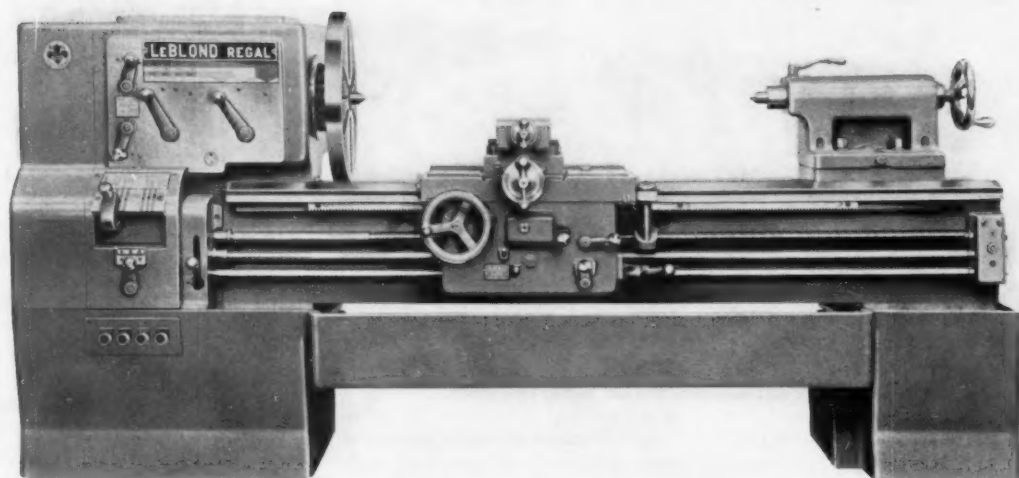
Snyder trunnion type special machine that drills, counterbores, reams, and taps fifty-eight different parts



# IN SHOP EQUIPMENT

**material-handling appliances recently introduced**

Edited by FREEMAN C. DUSTON



Large-swing lathe announced by R. K. LeBlond Machine Tool Co.

er center-distance specifications for the various parts. Variations in hole sizes are taken care of by changing tools that are mounted in adjustable adapter assemblies in the spindles.

When the machine has been set up for a specific group of parts, a part is loaded in the first station and a button is pushed. The two heads advance for the machining operation and retract. As the heads retract, the trunnion indexes counterclockwise (down and away from the operator) to the next station. Operation of the push-button again causes the heads to go through their advance and retract cycle. A finished part is produced with each index of the trunnion.

This trunnion type machine is electrically controlled and has two Snyder standard hydraulically operated way type machining units mounted on a welded-steel base. The units slide on hardened and ground ways and are lubricated

by a centralized automatic system. One 20-hp motor powers the multiple-spindle drill head and another 2-hp motor powers the tapping head in each of the machining units. The trunnion is indexed by a Snyder standard hydraulic-powered index mechanism. A separate motorized pump and tank unit provides hydraulic power for the machine. The coolant tank has a chip conveyor.

Circle Item 101 on postcard, page 221

## **LeBlond Regal Lathes of Large Swing Capacity**

The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, has announced 21- and 24-inch LeBlond Regal lathes with work, speed, and horsepower capacities usually found only in heavier type machines. Both models can be obtained with a standard 7 1/2-hp motor or an optional 10-hp motor for high speeds, electric clutch and brake, feed reverse at the

apron, heat-treated gears in the head, and quick-change box and apron. Other features include headstock with the exclusive LeBlond combination gear-belt drive construction now incorporated on the 16-inch LeBlond heavy-duty lathe.

The beds have hardened and ground replaceable steel ways, fitted according to the compensating V-way principle to insure better distribution of forces for long-time accuracy and minimum wear. Both a feed-rod and pre-loaded precision lead-screw are provided to insure continued accuracy in thread chasing. The lathes have three-bearing spindles, automatically lubricated quick-change gear-boxes, wide-carriage bridges with ample bearing surfaces and rugged tailstocks with plug clamping. In addition, general dimensions and construction details are patterned after LeBlond heavy-duty engine lathes.

Circle Item 102 on postcard, page 221

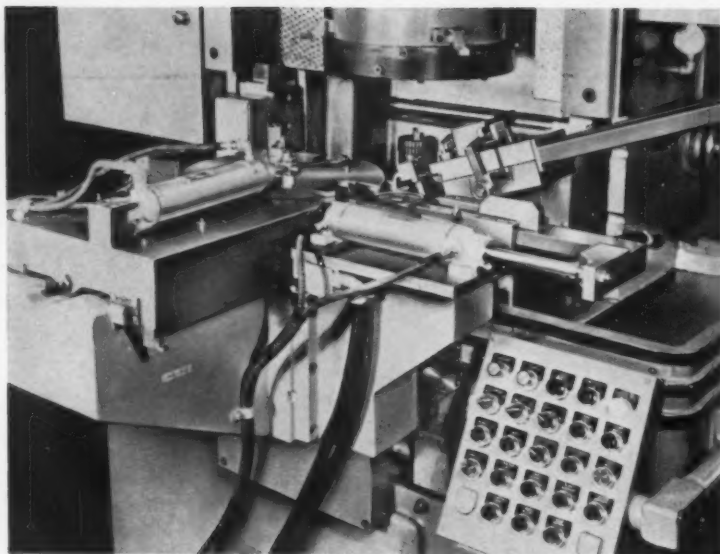


Fig. 1. Automatic parts loader, developed by Michigan Tool Co. and applied to its Shear-Speed gear shaper, feeds parts two-at-a-time

### Automated Parts-Loader for Gear Shaper

An automated loader that feeds parts at any rate up to the maximum speed capacity of the machine, and which swings clear of the machine to facilitate tool changing, has been developed by the Michigan Tool Co., Detroit, Mich. Designed initially for the Model 1853 Michigan Shear-Speed gear shaper, this new type loader, Fig. 1, can be adapted for all Shear-Speed machines in the 1800 series. It feeds parts, two-at-a-time, from a two-position (90-degree spacing) index dial. Parts enter the feeder from an entrance chute—one part dropping into a recess while mechanical fingers momentarily retain the second part. When released, the second part is stacked on top of the first. From this point both parts are transferred to the index dial, indexed, machined, and ejected as a unit.

In one production operation, the machine cuts a 36-tooth involute spline on a 0.580-inch face width of a clutch hub. The Michigan 1853 Shear-Speed gear shaper equipped with this new loader produces 180 parts an hour. Automatic cutting cycle for both parts is 32 seconds. Loading time for both parts, at 100 per cent efficiency, is only 8 seconds.

Interference of automating devices with tool changes and service requirements is avoided with this new loader. The swing-out arrangement permits the entire mechanism—feeder, index-table, and index-slide—to be swung completely clear of the machine. Pin-locked stops assure alignment.

Circle Item 103 on postcard, page 221

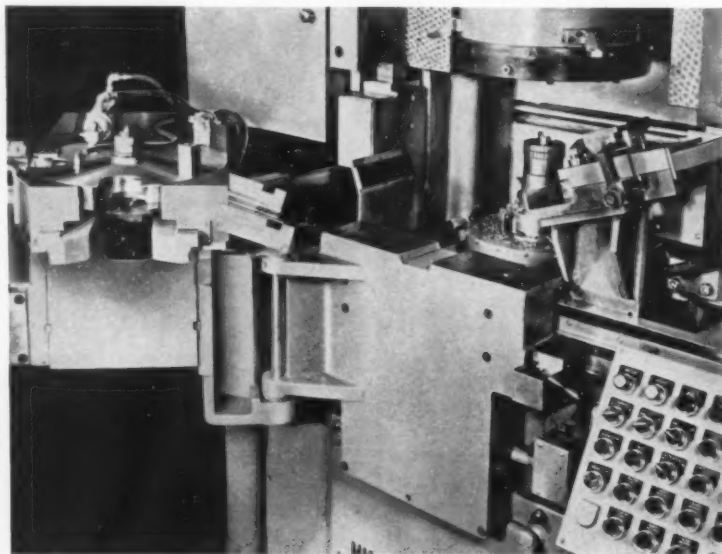


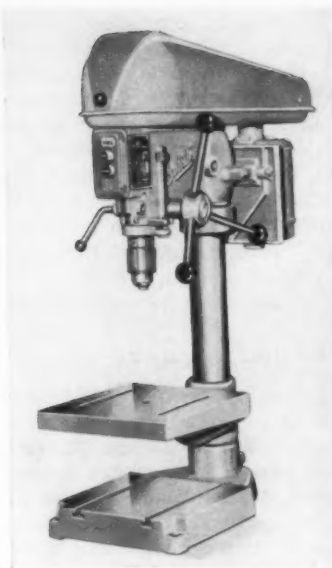
Fig. 2. Interference of automating devices when changing tools on machine shown in Fig. 1 is avoided with pivot-mounted loading device

### Improved Drilling and Tapping Machine

A new line of No. 15 drilling machines, tappers, and accessories introduced by the Buffalo Forge Co., Buffalo, N. Y., is said to have refinements in design which facilitate operation, maintenance, and flexibility. Improvements include front-mounted start-stop push-button switch, easily-seen speed range table, depth gage graduated for easy setting, and three-grip spindle feed.

The belt guard tilts upward to simplify speed changes and the motor bracket is hinged so that the belt may be changed from one step to another on the pulleys without adjusting the motor bracket. Proper belt tension is automatically maintained. No tools are needed for adjustments of head and table.

Newly designed bench and floor bases eliminate grease- and dirt-catching troughs and pockets around the work area. The complete line of Buffalo No. 15 drills includes bench, floor, and pedestal models. Bench and pedestal types are available in one- to six-spindle models. No. 15 attachments are available for tapping, mortising, routing, or back spot-facing. The new machines are extremely sensitive, assuring excellent results



Buffalo drilling machine

for small-hole drilling. They also have sufficient rigidity and weight to operate at full capacity without undue strain or wear.

Circle Item 104 on postcard, page 221

### In-Line Transfer Forming Machine

A three-station in-line transfer forming machine that produces four bends and contours in hot rectangular steel bars is now avail-

able from the Expert Automation Machine Co., Detroit, Mich. All bending and contour forming operations are performed in one working station to allow complete forming of the part while it is still at the required temperature for bending. This design also reduces overall machine size.

In the working station, an overhead hydraulically operated ram performs one bending operation while a hydraulically operated die

set performs the three remaining bending operations. With this type of design, the machine can be adapted to a variety of parts requiring various bends and contours by changing the die set.

The forming machine produces 500 formed automotive bumper-support arms per hour. It occupies a floor space about 5 feet by 10 feet, is 11 feet high and weighs approximately 10 tons.

Circle Item 105 on postcard, page 221

### Hill Automatic Opposed-Spindle Drilling Machine with Flexible Hole-Positioning System

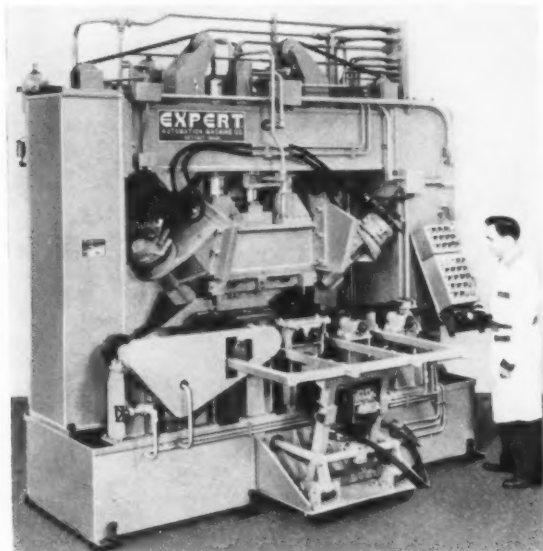
An opposed-spindle drilling machine featuring a new flexible automatic system for positioning heads and table to produce hole patterns in large, heavy sheets has been built by Walter P. Hill, Inc., Detroit, Mich. This fully automatic, hydraulic-powered, electrically controlled machine has been especially developed for drilling holes in tubesheets and baffles to be used in condensers, heat exchangers, evaporators, heaters, and all types of heat transfer equipment, including equipment for atomic-energy power plants.

The machine will handle sheets and baffles up to 6 feet in diameter and 10 inches thick and will produce holes at feed rates up to 18 inches per minute with conven-

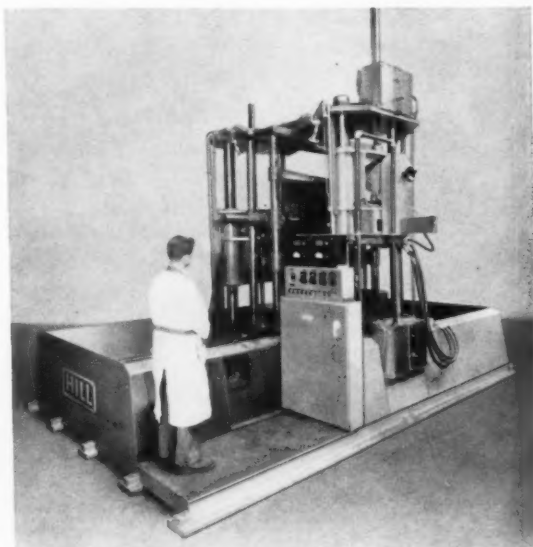
tional oil-flute drills. Uniform, straight, round holes are produced in a single drilling operation without reaming.

The new positioning system replaces a former index bar design and is applied to control both head and table index functions. Vertical and horizontal indexes are controlled by individual escapement wheels that are moved by shaved gears driven through shafts by racks and pinions on the table and heads. New hole spacings for different parts are obtained by inserting suitable change-gears between the shaft and the escapement wheel. The machine occupies a floor space of about 11 by 18 feet.

Circle Item 106 on postcard, page 221



Three-station forming machine announced by the Expert Automation Machine Co.



Automatic opposed-spindle drilling machine developed by Walter P. Hill, Inc.

### Fastraverse Double-Action Hydraulic Press

The Hydraulic Press Mfg. Co., a Division of Koehring Co., Mount Gilead, Ohio, recently built a 200-ton Fastraverse double-action hydraulic metal-forming press for use in the manufacture of electrical appliances and equipment. To meet safety requirements this H-P-M press was equipped to provide an 18-inch curtain of light across the front pressing area. When this curtain of light is interrupted, regardless of what phase of the cycle the press is in, a signal is automatically sent to the press control circuit which de-energizes the electrical controls and automatically sets the hydraulic pump on the reverse stroke. This lifts the slide to the starting position at the top of its stroke and stops the press.

The next cycle cannot be initiated until both buttons that control forward movement are depressed by the operator. Thus, any possibility of the operator getting near the pressing area while the machine is in operation is eliminated. This unique safety mechanism is housed in boxes

attached to the uprights on both sides of the press near the pressure gages.

The working area of the press is 36 by 42 inches, the daylight capacity 56 inches and the main slide stroke 36 inches. The press is equipped with a 100-ton blankholder and a 50-ton die cushion. Closing speed is 720 inches per

minute and the pressing speed is adjustable from 75 down to 7 1/2 inches per minute. The control station is separate from the press and is equipped with a flexible cable so that it can be located in the most convenient position. The press is powered by a 50-hp motor and a 50-gallon radial piston, reversible type hydraulic pump.

Circle Item 107 on postcard, page 221

### Weatherhead Angle Swaging Machine

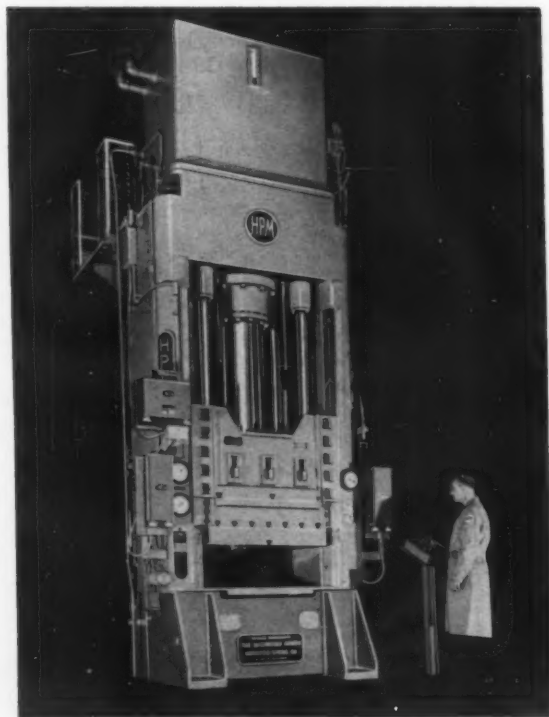
Greater operating convenience is an advantage claimed for a swaging machine announced by Weatherhead Co., Fort Wayne, Ind. For use in assembling hose, the swaging unit of this machine is inclined at an angle of 45 degrees, which permits the operator to remain in a normal upright position while setting up and controlling the swaging operation. It also facilitates the handling of large-size, long-length hose-assembling operations.

The change from the original Weatherhead vertical design to the new 45-degree mounting makes a more compact unit with

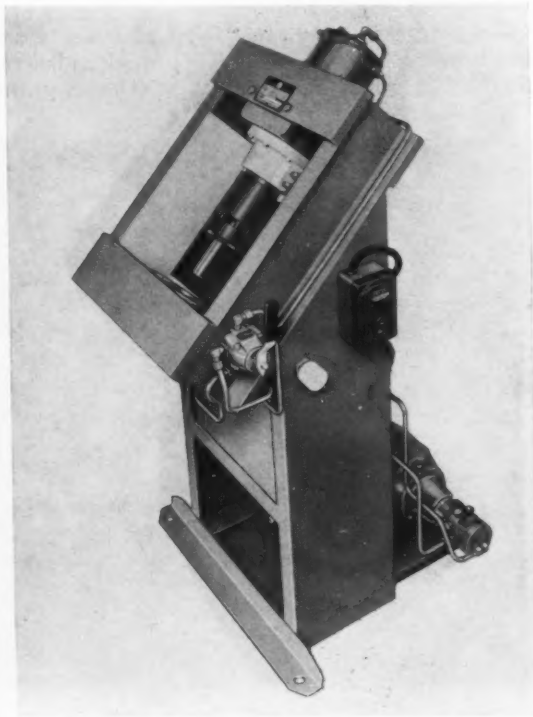
controls, gages, and work-center all on the same visual plane. It requires less installation space and less piping; gives easier accessibility to pump and reservoir for servicing; and lowers the center of gravity, thus adding strength and stability.

This new swaging machine is made in two standard models—WH 51 HMD high-speed, single-phase, for 110/220-volt, sixty-cycle circuits; and WH 53 HMD high-speed, three-phase, for 220/440-volt, sixty-cycle circuits. Either model can be equipped for any other power circuit.

Circle Item 108 on postcard, page 221

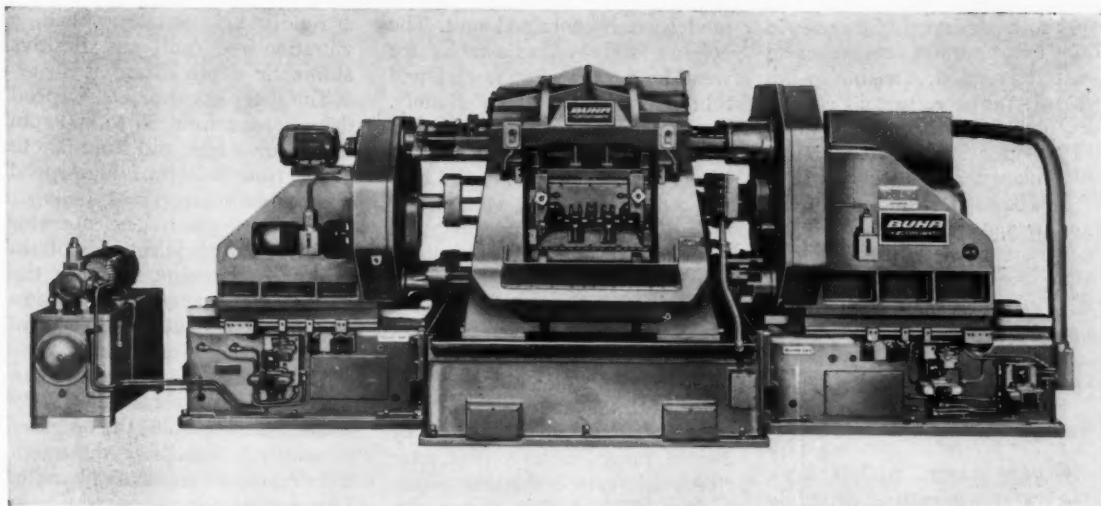


H-P-M Fastraverse double-action press



Weatherhead hose-assembling swaging machine





Six-station, two-way trunnion machine for processing automotive crankshafts

### Buhr Two-Way Trunnion Machine

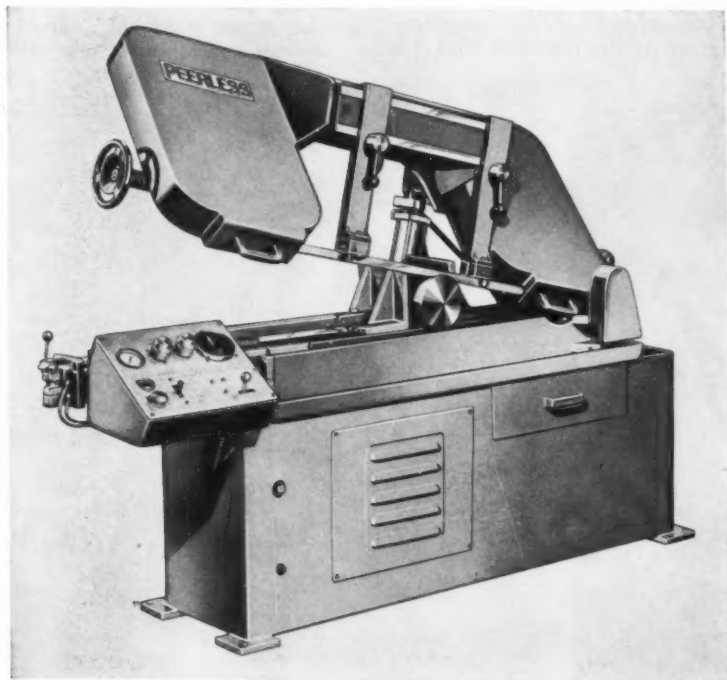
A six-station, two-way trunnion type machine capable of producing 64 automotive crankshafts per hour at an operating efficiency of 100 per cent has been announced by the Buhr Machine Tool Co., Ann Arbor, Mich. The machine is designed so that four different crankshafts can be processed without changing fixture details

or tooling. The left-hand head drills, countersinks, counterbores, spot-faces, and taps one hole in the front end of the crankshaft. The right-hand head drills, countersinks, and reams eight bolt holes, and drills, counterbores, and countersinks one hole in the rear end of the crankshaft.

The eight bolt holes are held

concentric with the outside diameter of the rear end flange by piloting the bushing plate on the flange of the work-piece. Features of the machine include: cluster heads with individual bushing plates incorporated in a master gear-box, standard and special parts which are interchangeable for easy maintenance, hardened and ground steel ways, automatic lubrication of all moving parts, and JIC standards throughout.

Circle Item 109 on postcard, page 221



Peerless high-speed production band saw

### Peerless Metal-Sawing Machines

The Peerless Machine Co., Racine, Wis., is introducing three metal-cutting band saws. The largest of these machines, shown in the illustration, is a high-speed production machine which automatically regulates blade pressure to achieve 100 per cent sawing efficiency. This machine has a counterbalanced saw frame which protects the work, the blade, and the operator. Under no circumstances can the frame fall on the work. The counterbalance holds the frame up and prevents accidents.

A 6- by 6-inch Speedy-Cut sawing machine with a variable-speed drive, and a fast-cutting 4- by 4-inch saw, designated the Handi-Cut, are the other two products included in the announcement.

The Speedy-Cut machine is

especially designed for use in shops and toolrooms requiring an accurate, rugged, variable-speed, general-purpose, metal-cutting band saw. Its variable-speed drive has an operating range of 50 to 140 strokes per minute.

The Handi-Cut, smallest of the three metal-sawing machines, is designed for use at the bench in shops handling job work, for field use, and in home work-shops.

Circle Item 110 on postcard, page 221

### Scherr Micro Projector

A micro projector introduced by the George Scherr Co., New York City, features a vertical principle of design that is said to have the following advantages: a horizontal stage on which work of a flat nature is simply laid without aid of fixtures or holding devices; an inclined screen on which the enlarged image is reproduced directly in front of the observer; a choice of fixed standard magnifications that are changed simply by slipping different projection lenses into a vertical socket in which they rest by gravity; and when using the micrometer cross-slide, both measuring motions can be made on the same horizontal plane.

A rigid floor base makes this

model a self-contained unit. The column slide is adjustable for wear by means of gibs and will retain its squareness indefinitely. A graduated adjustment facilitates tilting the stage to the desired helix angle of a thread or the rake angle of a form tool, etc. The 4-inch diameter stage opening and a round screen 14 inches in diameter permit handling large pieces. Custom-made, precision-coated lenses and achromatic condenser lenses are used for objectives of 10 to 100 $\times$  magnification.

Accessories such as a micrometer cross-slide stage with 2- by 2-inch range, rotary protractor ring reading to 5 minutes of arc by means of vernier, center support, surface illuminator, curtain canopy, and accessory chest add to the usefulness of the instrument. Clear and ground glass screens and special comparator charts are available.

Circle Item 111 on postcard, page 221

### Rockford Vertical Mill

An improved vertical mill, in which an infinitely variable spindle speed drive is an exclusive feature, has just been announced by the Fenind Engineering Co., Rockford, Ill. This machine, known as the Rockford Mill, has

a rigidly held rotating head, a vibration-free quill and positive automatic depth control.

The stepless variable speed drive ranges from 85 to 560 rpm in the low range and from 600 to 3720 rpm in the high-speed range. No changing of belts or gears is required. The operator sets the range selector knob in low or high range, watches the built-in tachometer dial, and simply rotates a hand-wheel control until he has the desired speed.

The head is rigidly secured to the ram with three bolts. By loosening these bolts, the operator can easily swivel the head through 360 degrees to any desired angle. The motor is mounted in the base of the mill to eliminate possible transfer of motor shock or vibration to the spindle. A positive quill control lever provides a stepless quill feed range from 0 (neutral) to 0.008 inch per revolution. Quill travel is stopped automatically by a built-in override clutch when the depth gage contacts a micrometer stop, preventing tool or work damage. An overload friction clutch is also provided. Extra features available include: a power feed to the table, precision scales with verniers and optical equipment for easy reading of the vernier scales.

Circle Item 112 on postcard, page 221



Micro projector introduced by George Scherr Co.

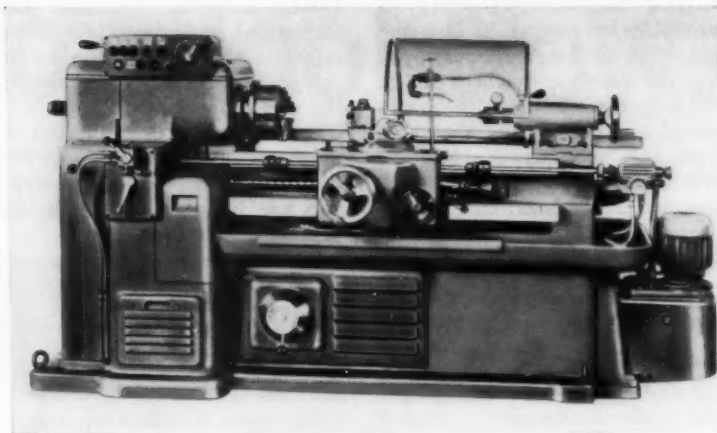


Rockford vertical mill announced by Fenind Engineering Co.

## Hydro-Magnetic Thread-Cutting Lathe

The Man-Au-Cycle Corporation of America, Brooklyn, N. Y., has announced the addition of the Man-Au-Cycle Hydro Magnetic to their line of automatic-cycle single-point thread-cutting lathes. This new unit is designed for exceptional speed in cutting long or short, internal or external threads. New features include: longer threading length (32 inches); increased lead capacity (0.0250 inch) to (2.00 inches); larger diameter swing (13 inches); larger hole through headstock (2 inches); electro-magnetic clutch and brake for instantaneous stop and start; improved system for multi-start operation; single control switch for start, stop, and neutral positions; hydraulically controlled tool cycle; hydraulically controlled sine bar type taper attachment; hydraulic facing and cut-off attachment; hydraulic turning and tracing attachment; air-chucking equipment, including pneumatic tailstock controls; self-centering chuck; cutting speeds increased to 400 lineal inches per minute; and greatly increased weight because of a heavier ribbed construction.

Threading operations with ceramic and/or carbide tools,



Man-Au-Cycle automatic cycle lathe equipped to demonstrate single-point thread cutting with Carboloy tools

worked out jointly with the Metallurgical Products Department of General Electric Co., Detroit, Mich., will be demonstrated at the

Man-Au-Cycle booth at the National Metal Exposition in Chicago, November 4-8.

Circle Item 113 on postcard, page 221

## All-Purpose Vertical Four-Slide Machine

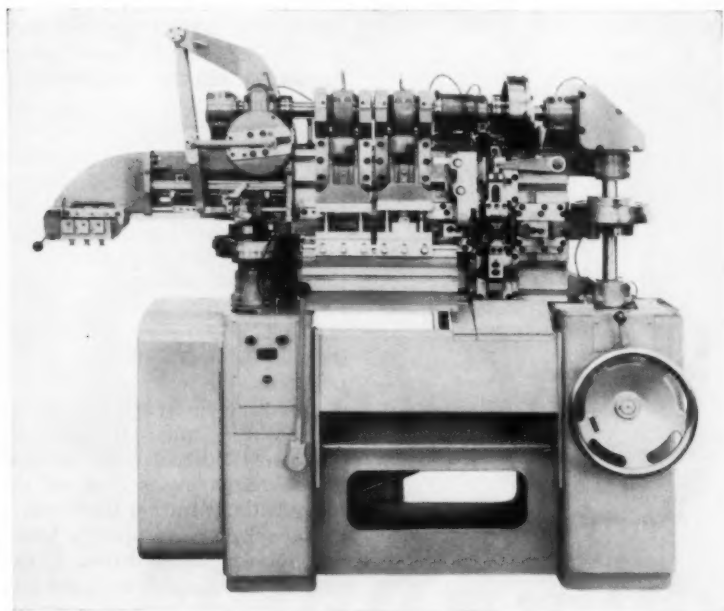
An all-purpose vertical four-slide machine, called the Verti-Slide, has just been announced by the Torrington Mfg. Co., Torrington, Conn. Outstanding operating advantages claimed for the vertical design include exceptional visibility, accessibility to all parts of the machine, and

reduced floor space. Most setup operations can be conveniently accomplished from a standing position in front of the machine. Adjustment of the feed-stroke, cams, presses, and cut-off are made from the same position.

Parts are ejected from the front of the machine. Conveying and handling movements for secondary operations can be easily mechanized. The center form is mounted in the bed, providing both a stronger and more rigid mounting, and a better view of the tooling area. An extra large mounting plate enables large tools to be fastened securely and economically.

The new machine is provided with an automatic centralized lubrication system. All important bearings are connected through nylon tubes to an air-operated pump. From 0.003 to 0.009 cubic inches of grease, depending on the bearing size, is forced onto the bearing surfaces through metering valves at predetermined intervals. Proper functioning of the system is monitored by a pressure switch that energizes a green pilot light.

The clutch located between the flywheel and the camshaft allows the flywheel to rotate continuously



Front view of vertical four-slide machine brought out by Torrington Mfg. Co.

so that the stored-up energy is available for jogging. It also permits the machine to be stopped quickly since the flywheel can be instantly disconnected. The hand-wheel is automatically separated from the main drive when the clutch is engaged, eliminating a common safety hazard.

Space is provided for three extremely strong crank type presses

having ball type pitmans. The slides and slide bases are separate assemblies which can be removed from the bed, permitting the use of special attachments or slides. All surfaces subjected to wear are of hardened steel. The slide cams are of the split type and are adjustable through 360 degrees.

Circle Item 114 on postcard, page 221

### Cimco Automatic Machine for Assembling Armature Cores for Automobile Heater Motors

Armature cores for an automobile heater motor are assembled automatically at the rate of 900 per hour on a 4CA-54 assembly machine brought out by the Cimco Engineering Co., Ann Arbor, Mich. The machine can assemble cores of varying lamination stack heights and core-shafts of varying lengths. With minor changes the diameter of the core-shaft can also be varied.

The eight-station machine is equipped with a 36-inch Cimco MDA-36LT-8 index-table and is completely automatic, requiring an attendant only to service the feed units. The feeding equipment consists of two hopper feeds for shaft bushings, a magazine feed unit to handle shafts, and two coil feed units which service the machine with insulating material which is cut and assembled in the

machine. The metal laminations, stamped out on other equipment located near the unit, are conveyed to three magazines on the assembling machine from which they are fed into the assembly. There are four separate hydraulic power units plus a separate control panel. The machine is 106 inches wide, 84 inches deep, and has an over-all height of 110 inches.

Circle Item 115 on postcard, page 221

### Automatic Feeder-Driver for Socket Set-Screws

Production equipment designed to automatically feed and drive standard socket set-screws at rates up to 1800 per hour was announced recently by the Socket Screw Division of the Bristol Co., Waterbury, Conn. The new ma-

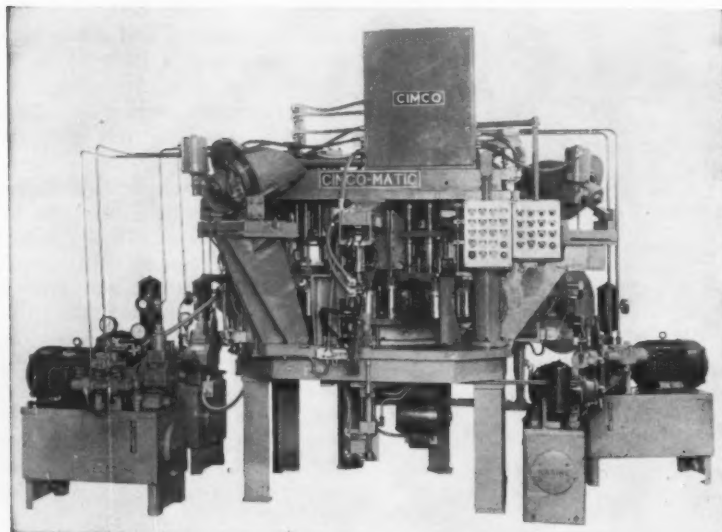


Automatic feeder-driver for socket set-screws built by Bristol Co.

chine will handle standard, unmodified socket set-screws in either hex or multiple-spline socket types, and with any of the standard points in diameters down to the No. 2 wire size and up to 5/8 inch in diameter.

The feeder unit is adapted to a modified Detroit power screwdriver and uses a mechanical rotating type hopper powered by a 1/12-hp motor. This feeds screws at random into an escapement or tube which enters a selector unit. This selector unit is the heart of the orientation system of the machine. After the selector receives the screw, it indexes about 30 degrees to a point directly above a feed tube which goes directly to the driver bit. A metal probe feels for the end of the screw, to determine which end is up. If the probe strikes solid metal, indicating the point end, the selector rotates 180 degrees, and the screw is dropped into the feed tube. If, however, the probe detects the hollow socket, the screw is dropped directly without further positioning.

The selector can operate faster than screws can be driven, so the limiting factor in its use is the rate of presentation of the parts or sub-assemblies to the machine



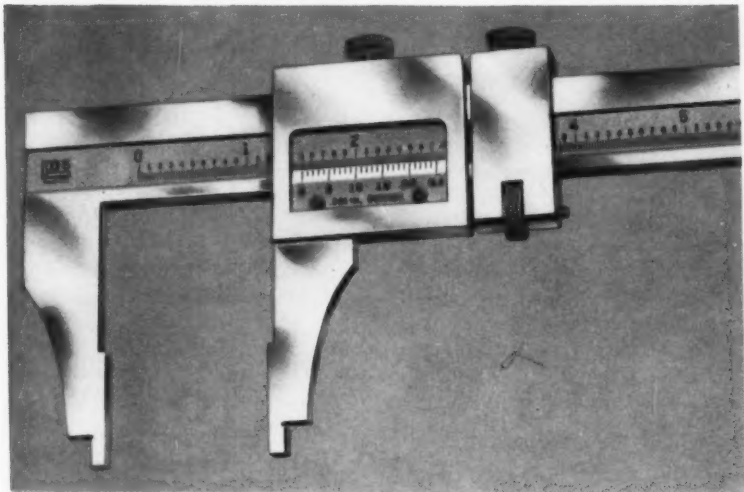
Automatic machine for assembling armature cores for heater motors brought out by the Cimco Engineering Co.



# Precision Tool News



REPORTING NEW DEVELOPMENTS AT BROWN & SHARPE'S PRECISION CENTER

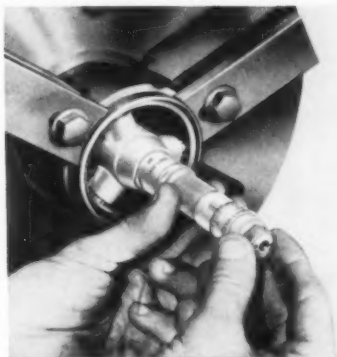


## Users Find Double-length Vernier Plate Just Right For Easy, Accurate Reading

In the few months that the Brown & Sharpe Super-Vernier Caliper has been on the market, it has created much enthusiasm among users. The new vernier plate is twice as long, making it twice as easy to align and read. Only a fraction of an inch has been added to the over-all length of the caliper in order to accommodate

the longer vernier plate; consequently the easy-to-read advantage has been gained without sacrificing the good-handling qualities of the tool.

Another aid to easy reading is the reflection-free dull-chrome background, against which the jet black, machine-cut graduations stand out in sharp contrast.

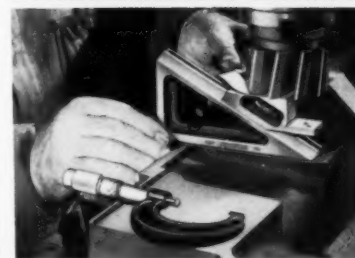
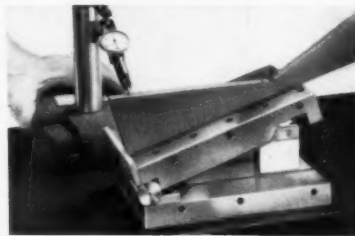


## B&S Intrimik Measures Hole Diameters Directly

Intrimik ("In-tri-mike") is a self-aligning, internal, tri-point micrometer that measures directly the I.D. of any hole within its range. It is more economical for measuring bores and holes of varied sizes than comparators or plug gages; and in production, where all holes are held to a close tolerance, it saves expense by showing the exact amount of metal still to be removed. Intrimiks are available individually or in five sets, to cover from .275" to 8.000". Sets are furnished in cases with calibrating rings, and with extensions which permit accurate measurements at depths to 15".

## Brown & Sharpe Announces Precision Sine Plate at Low Price of \$110

Brown & Sharpe offers this accurate, versatile new tool providing precision angular settings at a new low cost. The B&S Precision Sine Plate, No. 925, is made of case hardened and aged normalized steel . . . with a beautifully fitted hinge and glass-smooth finish. Machined and assembled to an over-all accuracy within .0002", it assures highly precise angular measurements when set to gage blocks. The working surface of the hinged plate is 3½" x 6"; distance between roll centers, 5". No. 925 has an end plate and plenty of tapped holes for special clamps or other holding devices.



Another new B&S tool, No. 624 Planer and Shaper Gage, is the most accurate gage of its kind for tool setting.

## Your Local Distributor Has These B&S Tools In Stock

For your convenience, Brown & Sharpe Precision Tools are stocked by leading distributors everywhere. Ask your local Brown & Sharpe distributor to show you these products, or write for additional information to Brown & Sharpe Mfg. Co., Providence, R. I.

WATCH WHAT'S HAPPENING AT

# Brown & Sharpe



PRECISION TOOLS AND GAGES • MILLING, GRINDING AND SCREW MACHINES • CUTTERS • MACHINE TOOL ACCESSORIES • GEAR, VANE AND CENTRIFUGAL PUMPS

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—209

and the rate of driving the screw.

Typical applications for the machine are in assembly and sub-assembly operations where a ring or knob is fastened to a shaft, as in radio or automotive manufacture; or in pulleys, sheaves, gears, locking rings, etc.

Circle Item 116 on postcard, page 221

### Surface Grinder

The Harvel Co., Pico, Calif., has brought out a surface grinder equipped with a direct motor-driven spindle mounted on precision pre-loaded ball bearings that are completely sealed and lubricated for life. A 1-hp motor, which has an operating speed of 1750 rpm, is included with the push-button starter. The motor and spindle assembly is balanced and designed to use a grinding wheel 12 inches in diameter.

The working surface of the table is 10 by 16 inches and is finish-ground for precise parallelism

and alignment. The back edge of the table and tee slots are ground square with the spindle and may be used for aligning work. Longitudinal travel of the table is obtained by means of a feed rack and pinion gear operated by a large handwheel. One revolution of the handwheel causes the table to travel a full 6 inches. The table

rides on one vee and one flat way. All feeds are obtained by hand.

Features include telescoping dust guard, chromium-plated handwheels, and adjustable table stops. The cross-feed handwheel has 0.001 inch graduations, and the elevating handwheel 0.00025 inch graduations.

Circle Item 117 on postcard, page 221

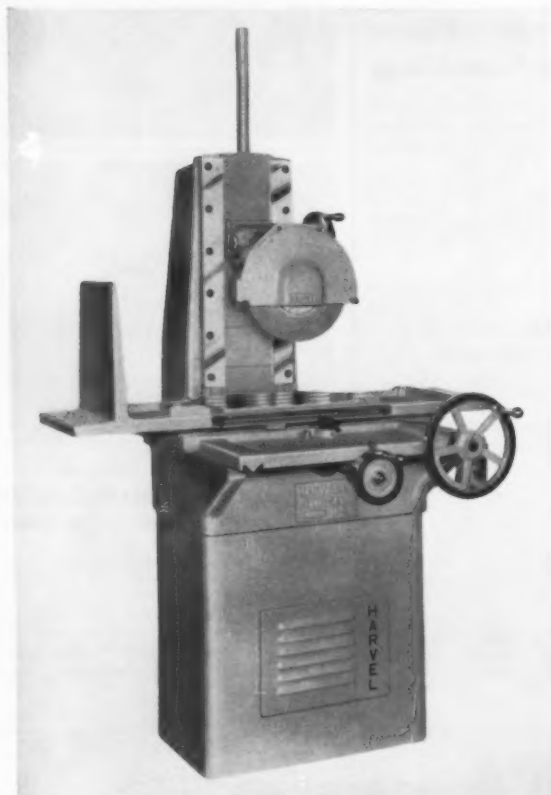
### Burr-Master Deburring and Chamfering Machine

A versatile single-station Burr-Master deburring and chamfering machine designed for the fast functional chamfering of slots is announced by the Modern Industrial Engineering Co., Detroit, Mich. This new machine (Model BMI-15M), Fig. 1, will deburr and chamfer slots around the periphery of a part at production rates of over 200 parts an hour. Thus it permits the mechanization of an operation usually done by hand. Although initially developed for a six-slot transmission

part, the basic design of the custom-tailored tooling is adaptable to a broad range of applications.

With a push-button controlled, completely automatic machining cycle, operation is so simplified that a skilled operator is not required. This model, like the entire Burr-Master line, comes to a full stop with the cutting tools safely and fully retracted when the chamfering is completed.

For processing the automatic transmission part which consists of a planet ring-gear carrier with



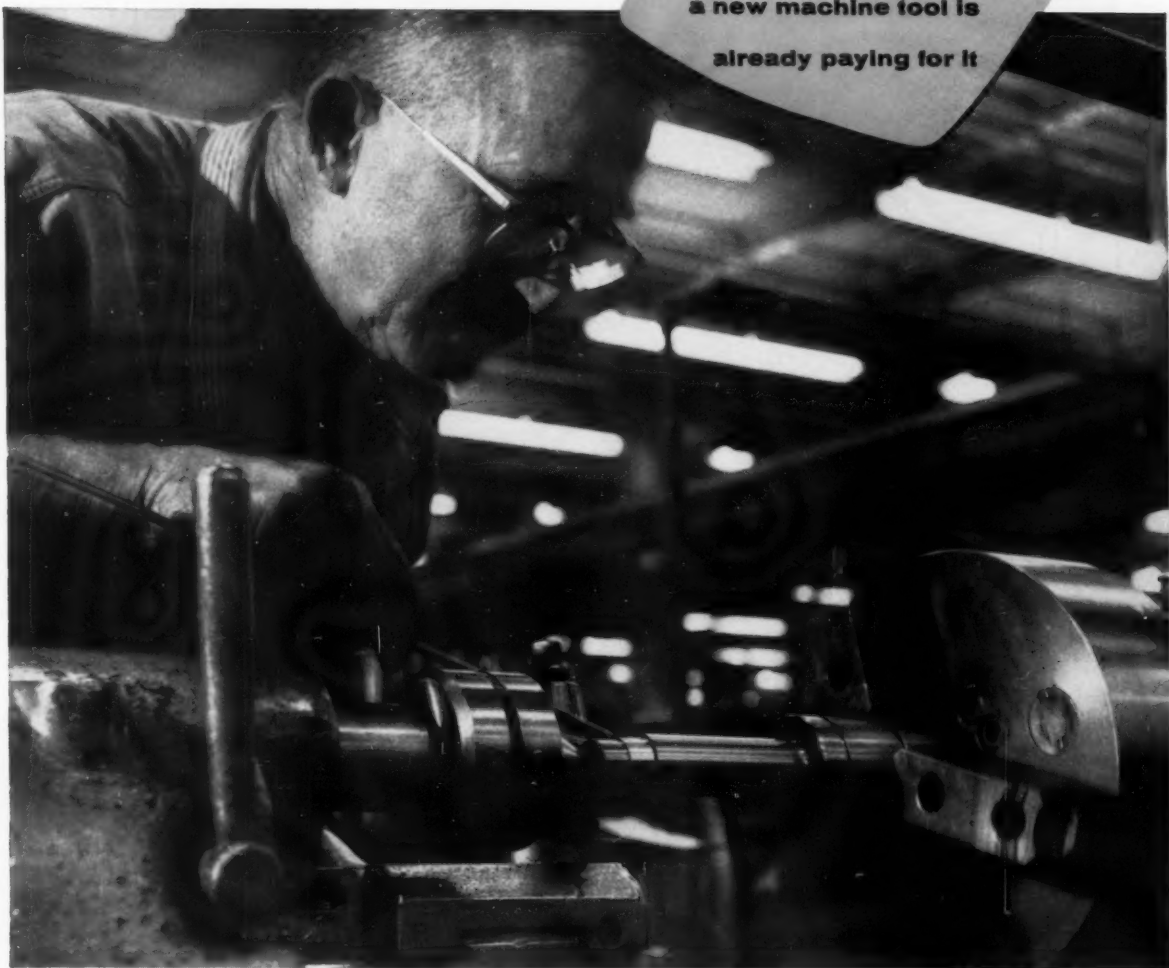
Surface grinding machine for precision work brought out by the Harvel Co.



Fig. 1. Burr-Master deburring and chamfering machine announced by Modern Industrial Engineering Co.

## JONES & LAMSON MACHINE COMPANY

the man who needs  
a new machine tool is  
already paying for it



### Still useful, yes . . . but is it still Profitable?

When the purchase of new machine tools comes up for discussion, it's not at all unusual for someone to comment — "but our present machines still seem to be doing a good job".

On the surface, this objection seems to make good sense. It doesn't stand up, however, because it isn't good economics.

While surveying a number of metalworking plants recently, a prominent industrial publisher discovered this startling fact: — *In every plant with machinery more than ten years*

*old, profit margins were steadily falling!*

Why should this be the case, especially when sales were at an all-time high?

The answer, of course, is that older, still "useful" machines cannot produce enough goods at a low enough cost to compete favorably with new machines on a profit basis.

Write for J & L's Replacement Information Kit, which contains much valuable information. Jones & Lamson Machine Company, 512 Clinton St., Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Threading Dies, Taps & Chasers

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—211

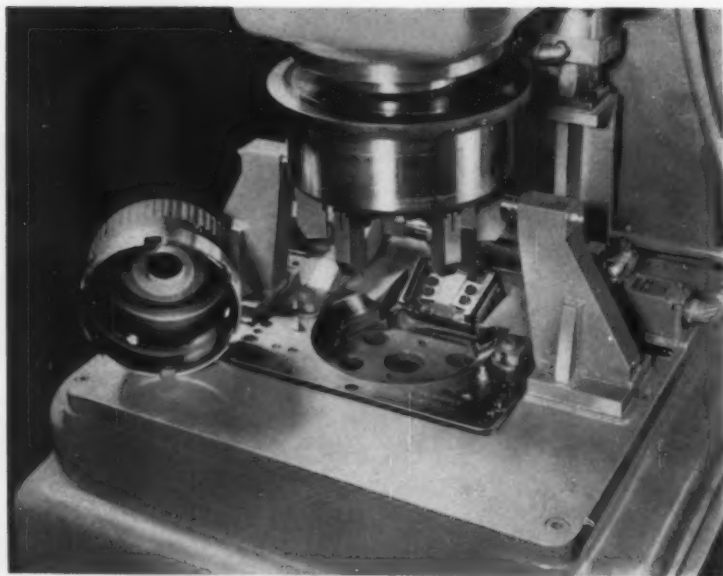


Fig. 2. Close-up of slot-chamfering and deburring tool equipment of machine shown in Fig. 1

six slots radially located around its circumference, the new Burr-Master uses two dovetail type form tools. The part has an outside diameter of 5.75 inches and the wall thickness of the slots is about 0.125 inch. The tools reciprocate at the rate of 2 1/2 strokes per second, straddle-cutting the sides and bottom of each slot. Each tool chamfers (and deburrs at the same time) one side and

half of the bottom of the slot. The automatic cutting cycle for all size slots is only 3 seconds. The time cycle for each part, includ-

ing manual loading and unloading is 18 seconds. All sharp edges on the outer face of the slot are eliminated by the patented cutting action that generates this critical-depth chamfer uniformly within the specified dimension.

The parts are manually loaded in the work-station and a radial locator is actuated by the operator to assure positive part positioning. As the machine drive is started, the quill comes down and the part is automatically clamped in place by an air chuck. The parts locator is then retracted and the cutting cycle is started by pressing two push-buttons mounted on opposite sides of the machine for maximum safety.

The cutting cycle energizes an electric counter that controls the slot-chamfering. At the end of the proper number of strokes, the counter automatically stops the cutters in a retracted position; the part locator re-enters the part; the part is unclamped and the quill is raised. The operator then unloads the work.

Circle Item 118 on postcard, page 221

### Ex-Cell-O Machine Equipped to Bor-Drill Small Parts

The Ex-Cell-O Corporation, Detroit, Mich., recently equipped two of their Style 112-D precision boring machines for the Bor-Dril

process. The operations performed by these machines consist of drilling accurate, close-tolerance holes from the solid in

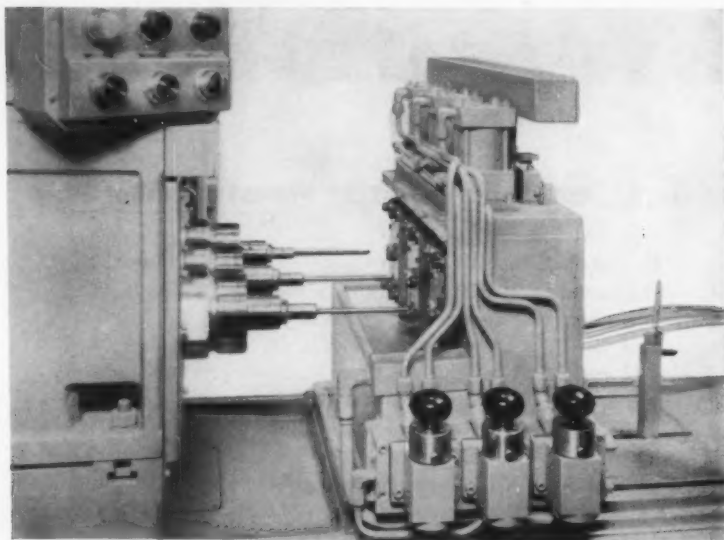


Fig. 1. (Left) Close-up of Ex-Cell-O machine equipped to Bor-Drill automotive parts. Fig. 2. (Right) Automotive transmission range selector shafts drilled by equipment shown in Fig. 1.



## JONES & LAMSON MACHINE TOOLS

the man who needs  
a new machine tool is  
already paying for it



### **The Turret Lathe with a fully automatic thread-chasing cycle!**

Here is full turret lathe versatility and a threading attachment with a fully automatic cycle — all in one machine. Now you can be sure of concentricity of threading with other lathe work, *all done in one chucking*, with the time saving of the Auto-Threader!

This Auto-Threader will chase straight or taper threads — or a combination — internal or external, from the front of the machine.

Other features include: uniform thread length, by means of positive stop and follower nut disengagement together with rapid tool withdrawal; precision lead control by full depth follower nut engagement on a hardened and ground leader.

Write for descriptive folder No. 5440. Jones & Lamson Machine Company, 512 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Threading Dies, Taps & Chasers

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—213

shafts like the ones shown in Fig. 2. These transmission range-selector shafts are manually loaded and hydraulically clamped in a three-station fixture. Three Bor-Drill tools then advance simultaneously and bore a hole 0.312 to 0.313 inch in diameter, 2 1/2 inches long through each of the three parts.

A safety feature incorporated in the fixture of each machine automatically precludes the breakage of tools due to unclamped parts in the fixture. Should the operator fail to depress the knobs that actuate part clamping at each station, a safety clamp on top of the fixture retracts the machine table so that the tools cannot enter the work-pieces. The machine will not cycle until each part is securely clamped in its station.

Circle Item 119 on postcard, page 221

### Special Machine for Balancing Turbine Blades

A special machine for balancing single-stage turbine wheels in rotation has been developed from the standard line of Trebel vertical production balancers introduced by the American Trebel Division of Kurt Orban Co., Inc., Greenwich, Conn. The wheel is rotated inside a shroud at 650 rpm. At this speed, sufficient centrifugal force is generated to locate the blades in their operational position. Unbalance is then indicated on a meter in ounces, grams, or any other unit of correction. Angular position of unbalance is shown in degrees on a graduated



Turbine wheel balancing machine

disc inside the machine housing. Three indication ranges with variable ratios provide for high indicating accuracy and large initial unbalances. The entire acceleration, measuring, and deceleration cycle is controlled by a single lever.

Circle Item 120 on postcard, page 221

### Sheffield Air Gage for Non-Destructive Testing of Grinding Wheels

Extended tests by leading manufacturers and users of grinding wheels are said to indicate that an air gage made by the Sheffield Corporation, a subsidiary of Bendix Aviation Corporation, Dayton, Ohio, is making possible effective non-destructive comparative tests of density uniformity in grinding

wheels, honing sticks and other abrasive tools and products. This gage, consisting of either a three- or four-column Precisionaire, flows air into the grinding wheel and measures the flow by means of scale graduations known as the Sheffield index. While graduations have no relationship to abrasive grain sizes, the gage quickly and accurately compares and checks wheel uniformity.

The gage detects filling and provides an accurate method of exploring structural variations. It enables machine tool builders and users of grinders to select highly uniform wheels for super-precise grinding jobs where wheels of varying density are unsuitable.

Circle Item 121 on postcard, page 221

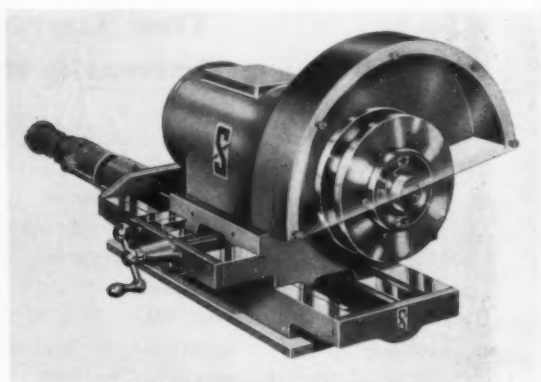
### Motorized Spindle for Grinding, Milling and Boring

The Standard Electrical Tool Co., Cincinnati, Ohio, is manufacturing a variety of versatile components that can be used to convert or adapt standard high-production machine tools for special work. These components provide a building-block system of units that can also be used for the economical construction of complete special metal-working machines and equipment. Usually, this simply requires the proper selection of a work-head; a motorized spindle for grinding, milling, boring, etc.; along with a suitable slide or feed.

The unit illustrated is being



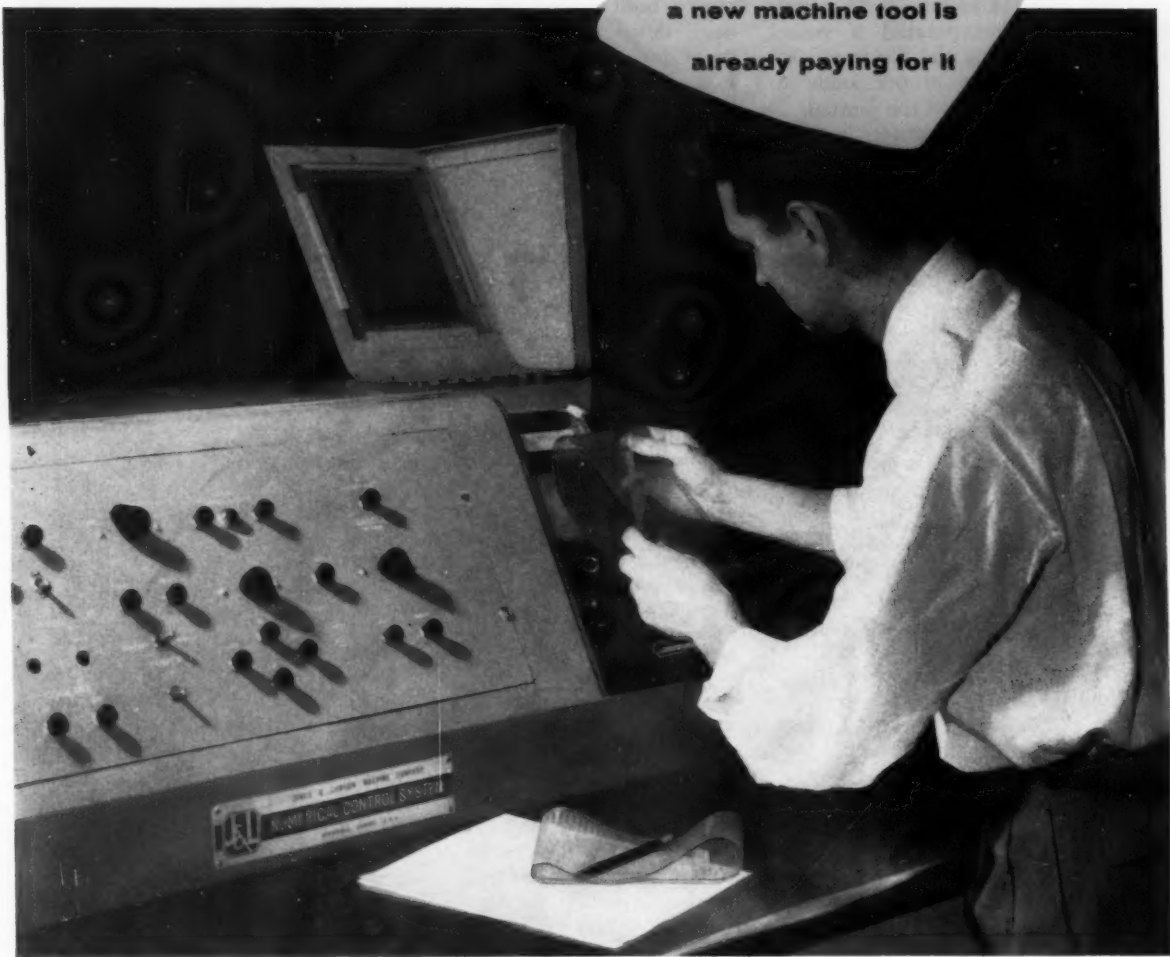
Precisionaire gage equipped for non-destructive uniformity testing of grinding wheels made by Sheffield Corporation



Unit containing "building-block" components made by Standard Electrical Tool Co., for grinder conversion

## JONES & LAMSON "AUTOMATION"

the man who needs  
a new machine tool is  
already paying for it



### J&L's Unique Approach to "Automation"

"Automation" is a tricky word — one that has many definitions. However, at Jones & Lamson its basic meaning is always the same ... "the solution to a cost reduction problem".

In some cases, this could involve automatic in-process gaging, size adjustment feed back, self-resetting of tools, and automatic handling for long runs on single machines. Other problems might call for an articulated, sequential line of machines, complete with automatic handling, inter-machine transfer and auto-

matic control of speeds, feeds, etc.

Through numerical control, using punched tapes, J&L "automation" *also greatly increases small-lot flexibility*. In this case, machine set-up and change-over become primarily an office procedure.

We would be pleased to show you how J&L's approach to "Automation" can be put to good use in *your* operations. Write for literature — Jones & Lamson Machine Company, 512 Clinton St., Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Threading Dies, Taps & Chasers

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—215

used for the conversion of an existing steel-mill roll grinder. The operation involves grinding the 6- to 14-inch diameter journals on a roll 3 to 4 feet in diameter by 12 to 14 feet long. The basic machine incorporated a swivel for positioning the illustrated assembly at the proper angle to grind the taper on the journal.

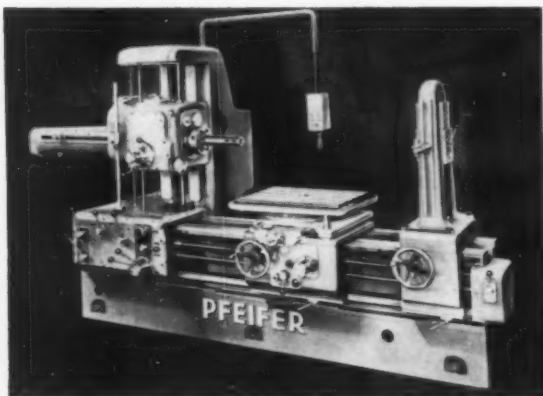
The simple approach in planning this conversion consisted of detailing or listing the units required—a 7 1/2 hp, precision motorized spindle having a speed of 1800 rpm and with a taper nose to accommodate a balancing type wheel holder for the 20-inch diameter resinoid bond wheel; a structural plate-steel wheel guard to protect the grinding wheel; a cross-feed for positioning and also to compensate for wheel wear; and a hydraulically-controlled air cylinder assembled on the feed unit with nonmetallic ways for traversing the grinding wheel.

Circle Item 122 on postcard, page 221

### Precision Boring Machine

The Aaron Machinery Co., Inc., New York City, has introduced in this country a new German-made Pfeifer boring mill. The machine is made with its spindle head at the left of the bed. This enables lathe operators to assume a natural position when running the machine. Operational controls are centrally located in easy reach of the operator in a position to which he is accustomed.

Circle Item 123 on postcard, page 221



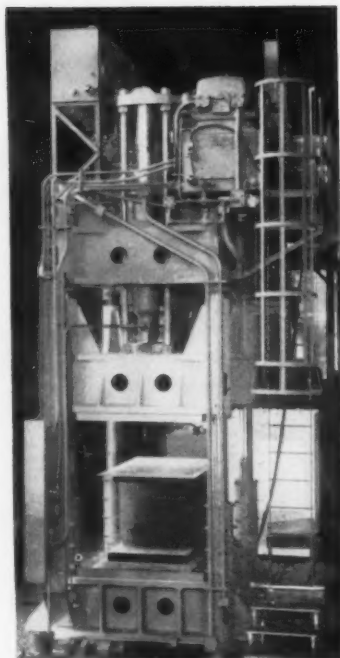
Pfeifer boring mill introduced in this country by Aaron Machinery Co., Inc.

### Birdsboro Metal-Forming Press

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., recently built a 600-ton, four-column, down-acting metal-forming press for the American Car & Foundry Division of ACF Industries, Inc., Berwick, Pa. The press has a large die space and an exceptionally large bed area measuring 112 inches right-to-left by 61 inches front-to-back. A cushion ejector is built into the bed. Daylight measurement is 73 inches and the stroke, 43 inches.

The equipment has its own self-contained oil-hydraulic power system. Two large radial piston pumps driven by a 200-hp motor deliver oil at rates up to 152 gallons per minute. Up-and-down, full-tonnage stops are provided to prevent over-stroking. Inserted outside packed cylinders are used in the construction of the machine. A ladder with a safety cage and a catwalk permit easy maintenance of the pump system. The over-all height of the press is 35 feet.

Circle Item 124 on postcard, page 221



Four-column metal-forming press built by Birdsboro Steel Foundry & Machine Co.

### Lewis Wire Straightening and Cutting Machine

The Lewis Machine Co., Cleveland, Ohio, has announced a new 2CV Convertible series of wire straightening and cutting machines. These new machines are equipped with variable speed drives and dual-center rotary straightener arbors. They have a

capacity for handling wire from 1/16 to 1/4 inch in diameter.

The outstanding feature of this series is the dual-center straightener arbor which increases the range of the machine and makes it possible to precision straighten small-diameter wire that is below the size range of regular machines. Higher production with greater accuracy is said to be achieved through the use of a variable speed drive which per-



Wire straightening and cutting machine announced by the Lewis Machine Co.



## JONES & LAMSON OPTICAL COMPARATORS

the man who needs  
a new machine tool is  
already paying for it



### **Simulated machining operations give production control as well as absolute inspection**

At J&L we answer an inspection problem by asking, "How was the piece made?"

Take, for instance, this inspection of broached slots in turbine discs. Holding fixtures are similar to those used in the actual broaching operation. Measurements are taken, right and left, as on the broaching machine. During inspection, the part moves in the same planes as it does while it is being machined. And the combination of light, optics and chart act as the cutting tool.

Through this visualization of the machining operation, it is a simple matter for the operator to take measurements on the comparator and then go back to the broaching machine to make any necessary adjustments.

Thus, with J&L, you not only inspect end products but, more importantly, you find out *where* and *when* to adjust the manufacturing process. Write to Jones & Lamson Machine Company, 512 Clinton Street, Springfield, Vermont, for literature.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Threading Dies, Taps & Chasers

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—217

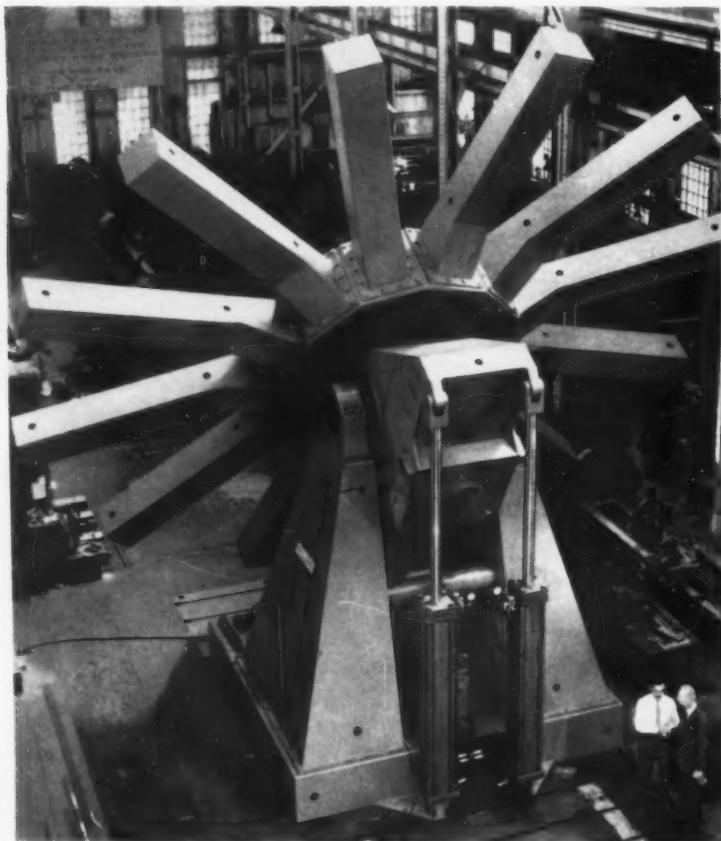
mits the correct feed speed (up to 200 feet per minute) to be used for each job.

The new machine comes equipped with the dual-center rotary straightener arbor for handling round wire and can be quickly and easily converted to handle shapes, hex, or flats by installing the Lewis interchangeable roll straightener.

Circle Item 125 on postcard, page 221

### Huge Welding Positioner

A huge welding positioner, said to be the largest machine of its type in the world, is shown in the illustration undergoing tests recently in the machine shop at Bethlehem Pacific's San Francisco shipyard, where it was built. It will be used at Mare Island Naval Shipyard for holding extremely large units in place while they are being welded automatically.



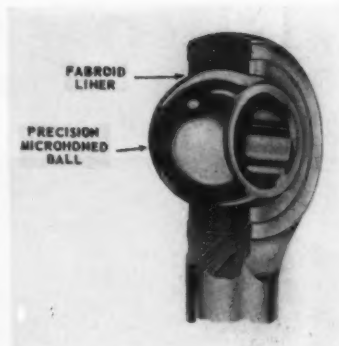
Giant size welding positioner designed by Pandjiris Weldment Co., and built by Bethlehem Pacific

Weighing 100 tons, the positioner has an over-all height of 20 feet, 10 inches. Its table, looking somewhat like a rimless spoked wheel, has a diameter of 33 feet. By means of a 2,000-lb hydraulic system which operates two plungers, the table can be tilted to any angle up to 60 degrees.

The machine is equipped with two electric motors which turn the table—a 2-hp motor for slow forward and reverse speeds, and a 7 1/2-hp motor for rapid traverse. The 2-hp motor turns the table at speeds ranging from 0.005 to 0.05 rpm—so slowly that movement can scarcely be seen. At the lower speed, it takes the table more than three hours to make a complete revolution.

The positioner was designed and sold to the Naval Shipyard by the Pandjiris Weldment Co., St. Louis, Mo., and Manufactured by Bethlehem Pacific.

Circle Item 126 on postcard, page 221



Self-aligning, self-lubricated Fabroid bearing developed by Micromatic Hone Corporation

### Micromatic Self-Lubricating Bearing

A new type of self-lubricating bearing has been developed by the Micro-Precision Division of The Micromatic Hone Corporation, Evanston, Ill. This bearing, marketed under the registered trade name of Fabroid, has been tested with outstanding success on numerous applications, including airplanes and missiles.

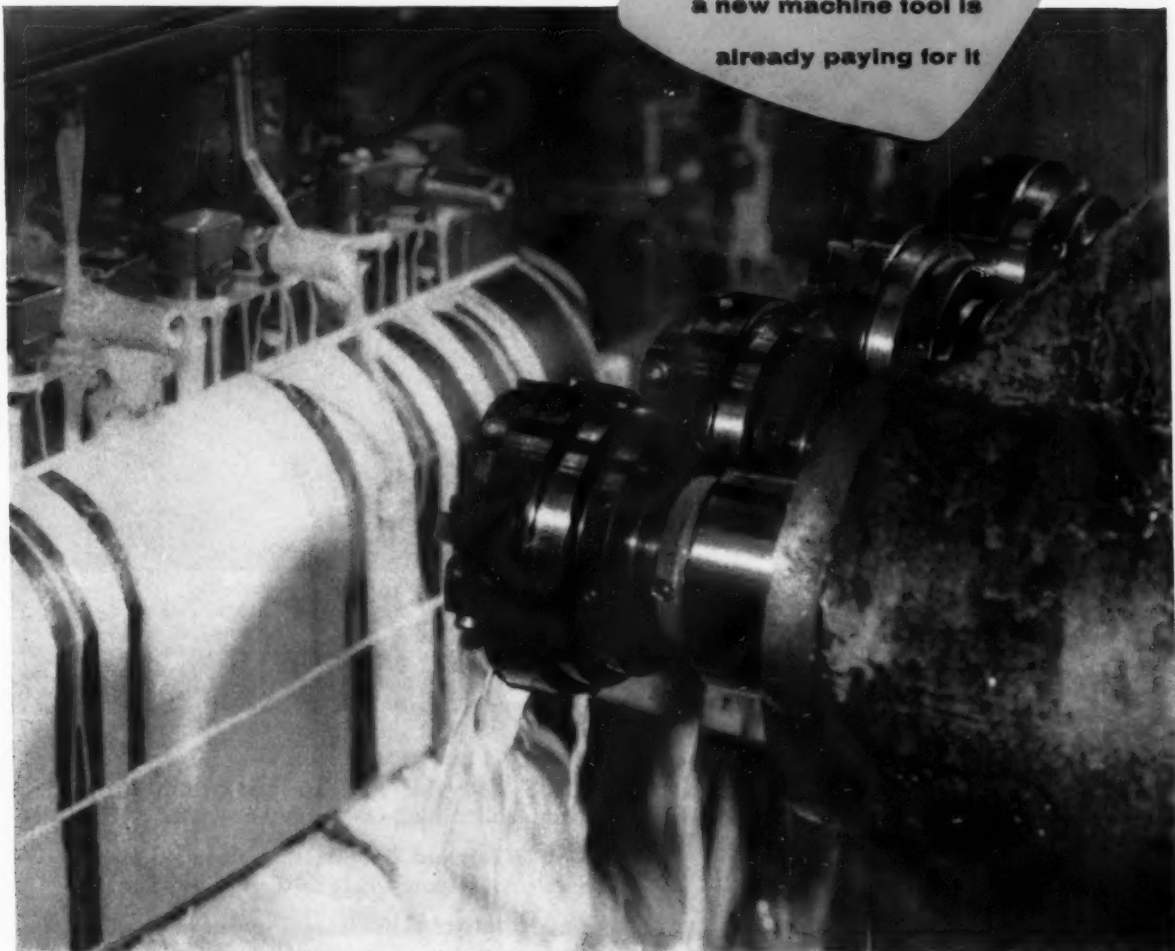
The Fabroid bearing is a composite structure consisting of two fused layers. The bearing face is a weave of Teflon fibers interwoven on the back with glass fibers. The back-up layer is a weave of glass fibers impregnated with thermosetting phenolic. These two layers are bonded and cured at elevated pressures and temperatures, resulting in a dense lattice of Teflon fibers facing the bearing surface and intimately supported by an inter-linked glass-phenolic structure.

When subjected to bearing loads transmitted by the cooperating bearing surface, the Fabroid presents properties which differ materially from any other known form of Teflon plastic. This difference stems essentially from the fact that in the Fabroid structure each strand of Teflon is completely surrounded by a supporting structure. When intimate contact exists between the two bearing surfaces under load, these separate strands of Teflon are locked and therefore prevented from extruding. Because of this principle, the Fabroid bearings

(Continued on page 226)

## JONES & LAMSON THREAD TOOLS

the man who needs  
a new machine tool is  
already paying for it



### Wholesale Hollow Milling with J&L Die Heads

This is part of a transfer machine set-up that uses 48 J & L Die Heads on hollow milling operations. Rough and finish turning is performed on both ends of automotive suspension shafts, as 1440 finished parts come off the line every hour.

Even in single spindle set-ups, hollow milling chasers in J & L Die Heads remove metal *four times faster* than single point tooling. And in many cases, J & L threading Die Heads can

be adapted to hollow milling, by merely using the required turning chasers.

Chasers for multiple turning and contour forming, as well as straight or taper turning, can be used in J & L Die Heads for hollow milling on most types of turning equipment.

Write for booklets — "Hollow Milling with Die Heads", and "Let's Talk about Thread Tools". Jones & Lamson Machine Company, 512 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Threading Dies, Taps & Chasers

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—219



## TO REDUCE WELDING COSTS **JETWELD IT!**

Lincoln Jetweld iron-powder electrodes increase welding speeds as much as 50%. Higher welding currents, greater deposition rate, and self-cleaning characteristics make possible drastic reductions in welding labor costs.

Weld appearance is smoother, approaching the bead quality of an automatic weld.

The Lincoln Jetweld family of iron-powder electrodes is available in four different classifications to meet a wide variety of welding requirements.

**E-6024 Jetweld 1** for extra-fast welding of flat and horizontal fillet with AC or DC.

**E-6027 Jetweld 2** especially well-suited for deep groove butt welds in the flat position.

**E-6016 Jetweld LH-70** for all-position welding of all steels and for welding steels of poor weldability.

**E-7020 Jetweld 2-HT** . . . for high-tensile deep groove butt welds and fillets in flat position.

For complete information on Jetwelding or the Jetweld electrodes, write for Bulletin SB-1351.

**THE LINCOLN ELECTRIC COMPANY**

Dept. 1224, Cleveland 17, Ohio

*The World's Largest Manufacturer of Arc Welding Equipment*

**W**hen  
Jetweld  
electrodes

**H**ave  
higher  
deposition rates

**Y**et give  
easiest operating  
qualities

**WHY**  
use anything  
but Jetweld



# PRODUCT INFORMATION SERVICE

Use postage-free Business Reply Cards for further information  
On New Catalogues described in this issue of **MACHINERY**  
On New Shop Equipment described in the editorial pages  
On products shown in the advertisements

## NEW CATALOGUES

**PROFILOMETER SLIDE CHART**—Micro-metrical Mfg. Co., Ann Arbor, Mich. Profilometer slide chart for business and industry. One side of the chart provides information on determining the right machining operation to use in getting a desired micro-inch finish, typical applications, and tolerances. The other side of the chart serves as a compact set of operating instructions. By setting the arrow on the OD to be measured, the chart will tell the proper combination of Profilometer equipment to use. Copies of this chart may be had by writing to Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich., on your company letterhead.

**CUTTING TOOL RESEARCH DATA BOOK**—Warner & Swasey Co., Cleveland, Ohio, 32-page data book "Practical Cutting Tool Research," covering the application of modern tool materials to production metal turning. Illustrated with an array of photographs, charts, line drawings, and graphs, as well as information on ceramics and tool materials and techniques, this book may be obtained by writing to the Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

**SCREW MACHINE AIDS**—Kaiser Aluminum & Chemical Sales, Inc., Chicago, Ill. Three aids for screw machine operators, shop management, and metal buyers, including a guide for machine feeds and speeds, a quantity-weight slide-rule calculator, and a manual of basic information on machining aluminum. The guide furnishes a reference for the approximate cutting speeds and feeds of aluminum with standard automatic screw machine tools. The calculator is a device giving the pounds per one thousand pieces for hexagonal and round stock of the generally used aluminum alloys ranging in size from 1/8 inch to 1 3/4 inches. In addition it enables the readers to determine weight in pounds per foot of the four alloys in stock sizes ranging from 1/8 inch to 8 inches. Another table on the calculator lists typical mechanical properties for aluminum screw machine stock, including 2011, 2017, 2024, and 6061 alloys. 1

**ELECTRODE GUIDE**—Air Reduction Sales Co., a division of Air Reduction Co., Inc., New York City. 70-page catalogue 1318, called "Electrode Pocket Guide," featuring an electrode consumption calculator which provides data for calculating the consumption per linear foot in the welding of various types of joints; and descriptions of each Airco electrode, its color code, its application,

and the best procedure for its use in welding. Weldmetal chemical analyses and mechanical properties are fully explored; and related information such as the factors which determine electrode selection, industrial and government specifications for filler metals, and testing of deposited weld metal is also discussed. ....2

**AUTOMATIC PINCH JAW CHUCKS**—Cushman Chuck Co., Hartford, Conn.

4-page bulletin describing the company's line of pinch jaw chucks. This type chuck was originally designed for precision machining of jet-engine discs and rings and overcomes tool problems encountered when machining parts of large diameters and small cross-sections, or other workpieces unable to be held in standard work-holding devices. This folder also describes automatic operation of the pinch jaws and centering unit which is combined with the features of non-lift

## BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY—

**MACHINERY**

**93 WORTH STREET**

**NEW YORK 13, N.Y.**

**READERS' SERVICE DEPT.**

FIRST CLASS  
Permit No. 53  
(Sec. 34.9, P.L. & R.)  
New York, N. Y.

## BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY—

**MACHINERY**

**93 WORTH STREET**

**NEW YORK 13, N.Y.**

**READERS' SERVICE DEPT.**

FIRST CLASS  
Permit No. 53  
(Sec. 34.9, P.L. & R.)  
New York, N. Y.

pinch jaws, built-in repetitive accuracy, torque-controlled centering, uniform and positive pinching. . . . . 3

**STEEL SHAFT COLLARS**—Standard Pressed Steel Co., Jenkintown, Pa. 4-page folder describing common applications for Hollowell steel shaft collars in movie projectors and sound equipment, industrial and textile machinery, and on printing presses, materials handling equipment, and other machinery. The brochure discusses construction details and specific information on the collars available in forty-three standard sizes for shafts ranging from 1/8 inch to 3 inches in diameter. Also given is information on Hollowell cast-iron collars of both solid and split varieties. Solid sizes range from 3 3/16-inch bore size to 4 15/16 inches. Split sizes range from 15/16 inch to 4 15/16 inches. . . . . 4

**SPEED DRIVE SELECTOR**—General Electric Co., Schenectady, N. Y. Bulletin GEN-169, showing a slide-rule type plastic device designed to assist in selecting the proper motor control panel and operator's station of a general-purpose Thymotrol adjustable safety drive. The

selector covers both fractional and integral drives up to 3 hp. By setting the slide at the desired horsepower, proper ratings, frame sizes, and model principles can be rapidly determined. Also included are listings of standard and operational features, performance characteristics, and ordering instructions. . . . . 5

**MILLING MACHINES**—Onsrud Machine Works, Inc., Niles, Ill. 24-page catalogue 1162, describing the company's non-ferrous milling machines and covering design principles, data as to machine specifications, work capacities, hyper-speed cutting heads, and high feeds. . . . . 6

**WHEEL APPROACH CONTROL**—Landis Tool Co., Waynesboro, Pa. 4-page bulletin describing the wheel approach control and showing how it speeds the grinding cycle on Landis cylindrical grinders when work with large variations in stock have to be ground. . . . . 7

**BLAST CLEANING HOSE MACHINES**—Pangborn Corporation, Hagerstown, Md. 28-page bulletin 100C, describing fundamental methods of applying abrasives

from hand-operated nozzle blast cleaning units, as well as the applications of both wet and soft abrasives. A guide to correct hose machine selection is supplemented with a table showing how to match nozzle size with required abrasive size. Photographs, application data, and operation techniques are given for all sizes of cleaning machines from small suction feed units to the large automatic machines. . . . . 8

**LUBRICATING VALVES**—Farval Corporation, Cleveland, Ohio. 8-page bulletin 60-A, presenting centralized lubrication. Spray valves and spray valve panels are described, and their relation to proper lubrication of heavy industrial gearing and slide surfaces. The spray valves do away with hand swabbing, drip type lubricators, and lubricant sumps, and lessen premature gear wear and ultimate failure. Engineering considerations are discussed, as are sequence of operation and manual and automatic systems. . . . . 9

**WORM-GEAR DRIVES**—Cleveland Worm & Gear Co., Cleveland, Ohio. 16-page bulletin 145, describing worm-gear drives and their application to mechanical power transmission. Also covered is information on range of types, horsepower ratings, horizontal right-angle reducers, vertical reduction units, multiple reduction units, giant worm-gear reducers, worm-gear screw jacks, specialized reducers for custom-designed requirements, integrated assemblies, and worm-gear components for built-in drives. . . . . 10

**EMBOSSING PRESSES**—Minster Machine Co., Minster, Ohio. 8-page bulletin describing the company's knuckle joint embossing presses in capacities of 150 to 1000 tons for sizing, coining, embossing, and similar applications. Design and construction features which provide more single-stroke operations per minute, higher speeds, longer press life, and greater accuracy are covered in detail. The Minster recirculating lubrication system is shown on a full-page schematic diagram. Photographs of typical sizing, coining, and embossing operations are included. . . . . 11

**MULTI-SPINDLE UNITS**—Chicago Pneumatic Tool Co., New York City. 36-page bulletin 580-1, tabulating and illustrating more than thirty basic air motor units and torque-limiting components for multi-spindle screwdrivers and nut runners. Fully dimensioned outline drawings are included which will aid in developing preliminary plans for job-fitted production equipment. A section describes screwdriver-nut runner drives, and the principle of operation and application of Magnamatic direct-drive, stall-torque impact types of torque-limiting clutches. . . . . 12

**HIGH-FREQUENCY HEATING REVIEW**—Lepel High Frequency Laboratories, Inc., Woodside, N. Y. Publication providing information required in many applications and new fixture developments for high-frequency heating, as well as information relating to coil design, material selection, and practical time-saving suggestions. The review will be helpful to engineers interested in using induction heating to simplify manufacturing operations and to shop men responsible for production or plant maintenance. . . . . 13

**METAL-SHEET HANDLING EQUIPMENT**—Dexter Folder Co., New York City. 4-page bulletin covering the company's heavy-duty, metal-sheet handling equip-

| PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information. |    | CATALOGUES |    |
|---|----|------------|----|
| 1   | 2  | 3          | 4  |
| 5   | 6  | 7          | 8  |
| 9   | 10 | 11         | 12 |
| 13  | 14 | 15         | 16 |
| 17  | 18 | 19         | 20 |
| 21  | 22 | 23         | 24 |
| 25  | 26 | 27         | 28 |
| 29  | 30 | 31         | 32 |
| 33  | 34 | 35         |    |

| PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information. |     | NEW SHOP EQUIPMENT |     |
|---|-----|--------------------|-----|
| 101   | 102 | 103                | 104 |
| 105   | 106 | 107                | 108 |
| 109   | 110 | 111                | 112 |
| 113   | 114 | 115                | 116 |
| 117   | 118 | 119                | 120 |
| 121   | 122 | 123                | 124 |
| 125   | 126 | 127                | 128 |
| 129   | 130 | 131                | 132 |
| 133   | 134 | 135                | 136 |
| 137   | 138 | 139                | 140 |
| 141   | 142 | 143                | 144 |
| 145   | 146 | 147                | 148 |
| 149   | 150 | 151                | 152 |
| 153   | 154 | 155                | 156 |
| 157   | 158 | 159                | 160 |
| 161   | 162 | 163                |     |

| ADVERTISED PRODUCTS                |                      |
|------------------------------------|----------------------|
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Please print your name and address |                      |
| NAME . . . . .                     |                      |
| TITLE . . . . .                    |                      |
| COMPANY . . . . .                  |                      |
| CO. ADDRESS . . . . .              |                      |
| CITY . . . . .                     | ZONE . . . . .       |
| STATE . . . . .                    |                      |

This card is valid after February 1, 1958 M-11/57

| PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information. |    | CATALOGUES |    |
|---|----|------------|----|
| 1   | 2  | 3          | 4  |
| 5   | 6  | 7          | 8  |
| 9   | 10 | 11         | 12 |
| 13  | 14 | 15         | 16 |
| 17  | 18 | 19         | 20 |
| 21  | 22 | 23         | 24 |
| 25  | 26 | 27         | 28 |
| 29  | 30 | 31         | 32 |
| 33  | 34 | 35         |    |

| PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information. |     | NEW SHOP EQUIPMENT |     |
|---|-----|--------------------|-----|
| 101   | 102 | 103                | 104 |
| 105   | 106 | 107                | 108 |
| 109   | 110 | 111                | 112 |
| 113   | 114 | 115                | 116 |
| 117   | 118 | 119                | 120 |
| 121   | 122 | 123                | 124 |
| 125   | 126 | 127                | 128 |
| 129   | 130 | 131                | 132 |
| 133   | 134 | 135                | 136 |
| 137   | 138 | 139                | 140 |
| 141   | 142 | 143                | 144 |
| 145   | 146 | 147                | 148 |
| 149   | 150 | 151                | 152 |
| 153   | 154 | 155                | 156 |
| 157   | 158 | 159                | 160 |
| 161   | 162 | 163                |     |

| ADVERTISED PRODUCTS                |                      |
|------------------------------------|----------------------|
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Page . . . . .                     | Advertiser . . . . . |
| Please print your name and address |                      |
| NAME . . . . .                     |                      |
| TITLE . . . . .                    |                      |
| COMPANY . . . . .                  |                      |
| CO. ADDRESS . . . . .              |                      |
| CITY . . . . .                     | ZONE . . . . .       |
| STATE . . . . .                    |                      |

This card is valid after February 1, 1958 M-11/57

ment for automatically feeding and delivery piling of both ferrous and non-ferrous sheets in sizes up to 120 by 180 inches. Technical information includes operating speeds, thicknesses of sheet or plate handled, load capacities, and brief explanations of how the machines operate. ....14

**INDUCTION HEATERS**—Allis-Chalmers Mfg. Co., Milwaukee, Wis. 4-page bulletin 05B8513, covering features of the company's high-frequency motor-generator heating equipment, particularly applicable for efficient, low-cost brazing, annealing, deep-hardening, forging, and melting. Included is a description of 960-, 3000-, and 10,000-cycle, high-frequency motor-generator units available in sizes from 30 to 1250 kw. ...15

**UNIVERSAL GRINDERS**—Landis Tool Co., Waynesboro, Pa. 24-page catalogue describing and illustrating the company's 14- and 18-inch type CH universal grinders. Fifty-seven pictures and sketches, as well as specifications are included. ....16

**PIPE AND TUBE STRAIGHTENING**—Mackintosh-Hemphill Division, E. W. Bliss Co., Pittsburgh, Pa. 24-page bulletin 55, describing straightening problems and methods, and models specifications and dimensions. Included are operating instructions for the company's line of rotary straighteners, all of which now feature the three-post construction method. Another section contains advice on building entry and delivery tables, and information on supplemental uses for rotary straighteners. ....17

**PRECISION INSTRUMENT BALL BEARINGS**—New Departure Division General Motors Corporation, Bristol, Conn. 36-page catalogue describing ultra-precise ball bearings available for the fields of instrumentation and embracing such functions as computing, measuring, indicating, controlling, and others that must be accomplished with infinite accuracy. The company's full range of bearings of instrument classification are discussed, together with related aspects of maintenance. ....18

**AUTOMATION RE-TOOLING**—Baker Brothers, Inc., Toledo, Ohio. 8-page bulletin 117, "Baker Basics for Automation That's Easy to Retool," telling how the company's standard automation units can be re-tooled for different machining operations. Illustrations and descriptions show the basic machine when tooled for heavy boring; when re-tooled for multiple drilling or reaming; when tooled up for cross-feed facing; and how, with changes, this same machine drills, reams, and chamfers. ....19

**COLD-TREATING**—Alpha Electric Refrigeration Co., Detroit, Mich. 4-page catalogue covering cold-treating of low-temperature techniques. Equipment and its applications are described. Also listed are the accomplishments of shrink fit and stabilization in the fields of aeronautical instruments, laboratory testing, tool and fixture manufacture, scientific and fundamental research, precision gage manufacture, and aircraft production and assembly. ....20

**AUTOMATIC PRESSES**—Brandes Press Co., Cleveland, Ohio. 14-page brochure describing and listing specifications of the company's 15- to 4000-ton capacity automatic presses. These presses are of

the inverted type with crankshaft located below the bed to produce lower center of gravity for minimum vibration at high speeds. Specifications and illustrations of large, double-crank presses for king-size dies are included. ....21

**GROOVE GRINDING**—Jones & Lamson Machine Co., Springfield, Vt. Second Progress Report on the new perpetual form control for grinding wheel dressing which was jointly developed by J & L and Koebel Diamond Tool of Detroit. The text discusses the process and gives examples of narrow dimensional limit groove grinding. ....22

**HARD-FACING ELECTRODES**—Haynes Stellite Co., Division of Union Carbide Corporation, New York City. 8-page

booklet describing the chemical composition, some properties, typical applications, application procedures, and packaging for the twelve Haynes alloys that are available as electrodes. ....23

**STAINLESS STEELS**—Armco Steel Corporation, Middletown, Ohio. 28-page booklet P. O. 4757, describing the properties and applications of 17-4 PH and 17-7 PH stainless steels. Fabricating procedures for these precipitation-hardening alloys are covered, and examples of improved product design and performance are detailed. ....24

**INDUSTRIAL RADIOGRAPHIC MATERIALS**—Eastman Kodak Co., Rochester, N. Y. 16-page pamphlet "Materials and Accessories for Industrial Radiography," containing guide chart to aid selection

**FIRST CLASS**  
Permit No. 53  
(Sec. 34.9, P.L. & R.)  
New York, N. Y.

## BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY—

**MACHINERY**

**93 WORTH STREET**

**NEW YORK 13, N.Y.**

**READERS' SERVICE DEPT.**

USE THIS  CARD FOR INQUIRIES

USE THIS  CARD FOR SUBSCRIPTIONS

(See other side)

**FIRST CLASS**  
Permit No. 53  
(Sec. 34.9, P.L. & R.)  
New York, N. Y.

## BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY—

**MACHINERY**

**93 WORTH STREET**

**NEW YORK 13, N.Y.**

**SUBSCRIPTION DEPT.**

of Kodak film for various material thicknesses. Recommended development techniques are also listed in chart form. . . .25

**ALLOY FASTENERS**—Mercury Air Parts Co., Culver City, Calif. 22-page catalogue C22, listing thread fasteners, step studs, bolts, screws, and hardware items meeting AN, NAS, and MS requirements. Booklet illustrates 7000 difficult-to-obtain standards in all alloys and high-temperature metals. . . . .26

**TURRET LATHE MAINTENANCE**—Gisholt Machine Co., Madison, Wis. Wall chart entitled "Preventive Maintenance for the Gisholt Ram Type and Saddle Type Turret Lathes," covering cleanliness, lubrication, and inspection and adjustments. The chart is offered in two

sizes—22 1/2 by 33 1/2 inches for wall suspension, or folded and punched for three-ring binder. . . . .27

**AIR AND HYDRAULIC CYLINDERS**—Petch Mfg. Co., Detroit, Mich. 12-page catalogue 7a/Pet, giving information and engineering specifications regarding five types of cylinders: size 1 inch to 10 inches—air and low-pressure hydraulic, high-pressure hydraulic, Pemaco air and hydraulic, automation standard air and hydraulic; and 16-inch bore—special cylinders. . . . .28

**AUTOMATIC TURRET LATHES**—Jones & Lamson Machine Co., Springfield, Vt. 4-page folder describing completely automatic operation of the company's standard turret lathes. Ram and cross-

slide travel ranges for their ram type turret lathes, equipped with Lynn hydraulic drives, are also included. . . .29

**SURFACE GRINDERS**—Abrasive Machine Tool Co., East Providence, R. I. 6-page brochure giving a description of the company's Hydrabrasive precision surface grinder line. This folder illustrates and describes features, capacities, weights, and specifications of the Hydrabrasive 824, 1218, and 1224. . . . .30

**TRANSMISSION BELTS**—Russell Mfg. Co., Middletown, Conn. 6-page bulletin describing transmission belts for speeds up to 100,000 rpm and over. Brochure includes detailed technical data and graphs showing results of competitive tests as to belt life and elongation. . . .31

**GEARED FLEXIBLE COUPLINGS**—Link-Belt Co., Chicago, Ill. 12-page booklet 2775, detailing the pertinent application and selection data for couplings with maximum bores ranging up to 7 inches and ratings from 2 1/2 to 572 hp per 100 rpm. . . . .32

**STEAM HEAT-TREATMENT**—Leeds & Northrup Co., Phila., Pa. 20-page catalogue TD2-620 (1), describing the effect of steam atmosphere heat-treating on high-speed tool steel, cast iron, powdered iron, structural steel, bronzes and bronzes, aluminum, beryllium copper, and molded rubber. . . . .33

**HARDNESS TESTERS**—Torsion Balance Co., Clifton, N. J. 10-page bulletin describing the company's four combination hardness testers, each of which makes both regular and superficial Rockwell tests. Standard and accessory equipment is also covered. . . . .34

**CUTTING-OFF TOOLS**—Skee Mfg. Co., Austin, Tex. Illustrated folder describing the company's Anthony cutting-off tools. Specifications and various applications are included in the data given. . . .35

|   |    |            |    |
|---|----|------------|----|
| PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information. |    | CATALOGUES |    |
| 1   | 2  | 3          | 4  |
| 5   | 6  | 7          | 8  |
| 9   | 10 | 11         | 12 |
| 13  | 14 | 15         | 16 |
| 17  | 18 | 19         | 20 |
| 21  | 22 | 23         | 24 |
| 25  | 26 | 27         | 28 |
| 29  | 30 | 31         | 32 |
| 33  | 34 | 35         |    |

|                    |     |
|--------------------|-----|
| NEW SHOP EQUIPMENT |     |
| 101                | 102 |
| 103                | 104 |
| 105                | 106 |
| 107                | 108 |
| 109                | 110 |
| 111                | 112 |
| 113                | 114 |
| 115                | 116 |
| 117                | 118 |
| 119                | 120 |
| 121                | 122 |
| 123                | 124 |
| 125                | 126 |
| 127                | 128 |
| 129                | 130 |
| 131                | 132 |
| 133                | 134 |
| 135                | 136 |
| 137                | 138 |
| 139                | 140 |
| 141                | 142 |
| 143                | 144 |
| 145                | 146 |
| 147                | 148 |
| 149                | 150 |
| 151                | 152 |
| 153                | 154 |
| 155                | 156 |
| 157                | 158 |
| 159                | 160 |
| 161                | 162 |
| 163                |     |

|  |                      |
|--|----------------------|
| ADVERTISED PRODUCTS                      |                      |
| Page . . . . .                           | Advertiser . . . . . |
| Page . . . . .                           | Advertiser . . . . . |
| Page . . . . .                           | Advertiser . . . . . |
| Page . . . . .                           | Advertiser . . . . . |
| Please print your name and address       |                      |
| NAME . . . . .                           |                      |
| TITLE . . . . .                          |                      |
| COMPANY . . . . .                        |                      |
| CO. ADDRESS . . . . .                    |                      |
| CITY . . . . .                           |                      |
| STATE . . . . .                          |                      |
| This card is void after February 1, 1958 |                      |
| M-11/37                                  |                      |

## Are You Reading Your Own Copy of MACHINERY?

TO: MACHINERY, 93 Worth Street, New York 13, N. Y.

Please enter my subscription for the period indicated below, and send me my free copy of MACHINERY's DATA BINDER.

☐ ONE YEAR @ \$4.00    ☐ TWO YEARS @ \$7.00    ☐ THREE YEARS @ \$8.00  
(Deduct 5% from these prices if you send payment with your order)

Name . . . . .

Address . . . . .

City . . . . . Zone . . . . . State . . . . .

WE WOULD APPRECIATE THE INFORMATION BELOW FOR STATISTICAL CIRCULATION AUDITS

Position . . . . . Firm . . . . .

Firm Address . . . . .

City . . . . . Zone . . . . . State . . . . .

Chief product manufactured at this plant: . . . . .

Approximate number of employees (check one):

UNDER 50    51-100    101-500    501-1000    OVER 1000

M11/57

By having your own copy you can clip and file articles, Reference Sections, and Data Sheets for your own use . . . take plenty of time to read the important material in each issue.



### USE THIS HANDY ORDER FORM

Just fill in and mail this postcard today, and we'll start your subscription at once. **IN ADDITION, WE SHALL SEND YOU—FREE—A LOOSE-LEAF BINDER CONTAINING 148 PAGES OF DATA SHEETS . . . A BINDER THAT GROWS IN USEFULNESS EACH MONTH AS YOU ADD NEW MATERIAL.** (This offer good only in United States and Canada.)

Send in the card today.  
We'll bill you later.



**NEW  
design**

## **OLOFSSON Precision Boring Machine** gives added production advantages



**OLOFSSON Model 30-012  
Single End Precision Way  
Boring Machine**

PROVIDES FAST, ACCU-  
RATE ROUGH AND FINISH  
BORING, FACING, CHAM-  
FERING, TURNING AND  
GROOVING.

### **A TYPICAL APPLICATION**



Finish bore, turn o. d.,  
groove, and chamfer zinc  
die-cast pulley.

Rate of Production:  
190 pieces per hour.

### **These 7 design features give you greater production efficiency . . .**

1. New design provides low height to width ratio of spindles to ways.
2. Self contained hydraulic unit, separate from machine, for easy maintenance and elimination of heat problems.
3. Standard commercial hydraulic components throughout.
4. Nickel-iron, one piece ribbed base with integral fixture mounting pad and chip disposal basin.
5. Hardened and ground ways.
6. Conveniently located push-button control panel.
7. Forced feed lubrication.

FIND NOW THE  
30-012 FITS YOUR  
REQUIREMENTS. WRITE  
FOR LITERATURE.



**THE**



**LOFSSON CORPORATION**

2729 Lyons Ave., Lansing, Michigan

**MANUFACTURERS OF PRECISION BORING MACHINERY AND SPECIAL MACHINERY**

are able to support static loads of up to 60,000 psi.

The Fabroid liner, preformed by a drawing operation, is bonded to the inside of the retainer. The two retainers are then assembled around the ball and pressed into the outer ring of the bearing or into the body of the rod end. A lip is subsequently spun on the outside of each retainer and the entire assembly is cured at an elevated temperature and pressure.

As a result, a 100 per cent contact area conformity is achieved between the spherical surface of the ball and the Fabroid liner. It is because of the close geometric control of the spherical surface that the 100 per cent effective contact area is maintained.

Circle Item 127 on postcard, page 221

### Basket Loader for High-Speed Automatic Handling of Long Pinions

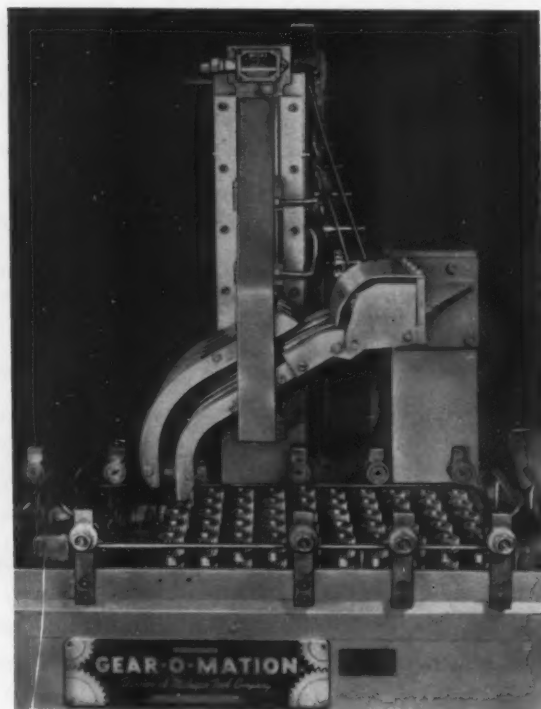
High-speed automatic basketing of parts prior to, during, or after processing has been extended to basket-loading of long pinions by means of a feeding

mechanism developed by the Gear-O-Mation Division, Michigan Tool Co., Detroit, Mich. The illustration shows the basketing unit for 2 1/2-inch long pinions, operated at a loading rate of up to 2500 pieces per hour.

In operation, parts are fed to a dropping mechanism through an enclosed track using chain lifts and gravity flow. The rate of feed is variable through standard interlocked limit switches—with all handling, even at high speed, gentle enough to assure delivery of unmarred parts. As they leave the incoming track, five rolling parts (one row of the basket) are guided and tipped through curved, channeled tracks and gravity fed onto upright basket prongs a row at a time.

Empty baskets enter the loader on a chain conveyor and are horizontally positioned by spring clips. Before passing beneath the drop, vertical positioning of the basket is assured by locked roller-guide retainment. Indexing of the basket is accomplished by limit switches through the chain drive.

Circle Item 128 on postcard, page 221



High-speed automatic basketing of long pinions with loader developed by Gear-O-Mation Division

### Electro-Mechanical Device for Precision Locating of Drilled Holes

A fast, simple, portable device called a "Jigamac" for use where jig-drilling and reaming is required for precise location of holes to an accuracy of plus or minus 0.0005 inch has been introduced by Wharton & Wilcocks of America, Inc., New York City. This device is adapted for use in machine shops and toolrooms, and for drilling operations on heavy maintenance work, large flat plates, castings, etc., where size or shape precludes the use of conventional jig borers. The "Jigamac" can also be used for drilling fixed objects after assembly has been completed without the necessity of dismantling.

The main unit consists of a 4 1/2-inch circular base with centering device in which an internally lighted optical unit is mounted. The base has a powerful electro-magnetic coil which firmly grips any flat steel surface at any angle. The centering device has a simple arrangement of

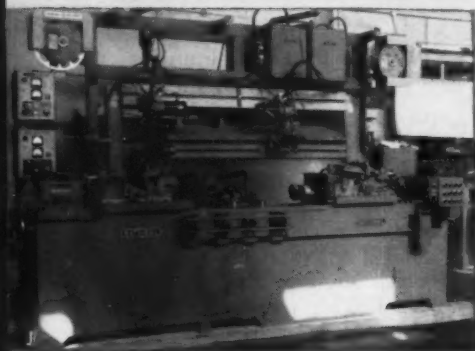


"Jigamac" electro-mechanical equipment for locating drilled holes introduced by Wharton & Wilcocks

# Accurate heavy cuts by this Cincinnati Rigid Shaper

... at NATIONAL  
ELECTRIC WELDING  
MACHINES CO.

Bay City, Michigan



The steel slide being machined will be used on a National Automatic MIG arc welder, such as shown above.

Economical production of this steel slide for an automatic arc welder requires heavy cutting with maintained accuracy. The machine chosen for this job is a 16" Cincinnati Heavy Duty Rigid Shaper. Some of the features which make this performance possible are:

- Extreme rigidity due to heavily ribbed column.
- Exclusive Cincinnati 50 PSI pressure lubrication.
- Maximum accuracy due to extended ram bearing and slot-free ram.
- Fast, easy operation due to electro-magnetic brake and clutch with finger-tip control.

Write **Department D** for Bulletin "CINCINNATI RIGID SHAPERS". We also suggest you consult our Application Engineering Department on your machining problems.

Photos courtesy National Electric Welding Machines Co., Bay City, Michigan.



## THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES

eccentrics which turn and lock, one inside the other, to provide compound movement for rapid and easy location. The center of the base is bored to receive the optical unit as well as the bushings.

The electrical equipment can be plugged into any wall outlet or lighting point on alternating current. The main switch, pilot lamp, and plugs for connection to the various components are mounted on a control panel. The

unit can be operated from batteries where a regular lighting circuit is not available.

The unit comes in a wooden box containing complete control panel, accessories and ninety-eight bushings for fractional, number, and letter size drills up to a maximum capacity of 1/2 inch. The entire unit weighs 43 pounds. Drilling can be performed on a machine or with a manually applied portable drill.

Circle Item 129 on postcard, page 221

### Avey Cut-Off and Gun-Drilling Machine

A new method of part processing is made possible by a cut-off and gun-drilling machine announced by the Avey Division, Motch & Merryweather Machinery Co., Cincinnati, Ohio. Any type of bar or extruded stock may be fed into this rotary indexing table type machine.

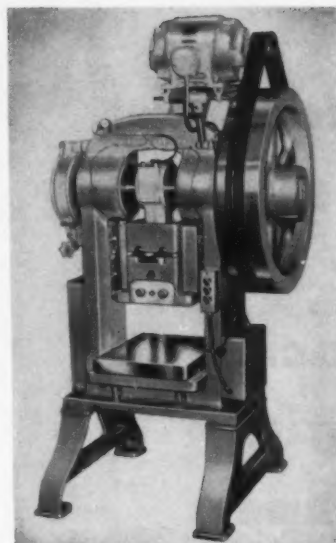
The machine consists of two Avey feed units and a standard Avey index-table. The following operations are performed on extruded aluminum bar stock: loading, feeding, cut-off, indexing of cut-off piece to broaching station, broaching, gun-drilling, countersinking, and ejection. All operations are automatic. The hole has

a 10 micro-inch finish. Net production of the machine is 300 parts per hour.

Circle Item 130 on postcard, page 221

### Perkins Straight Side Flywheel Press

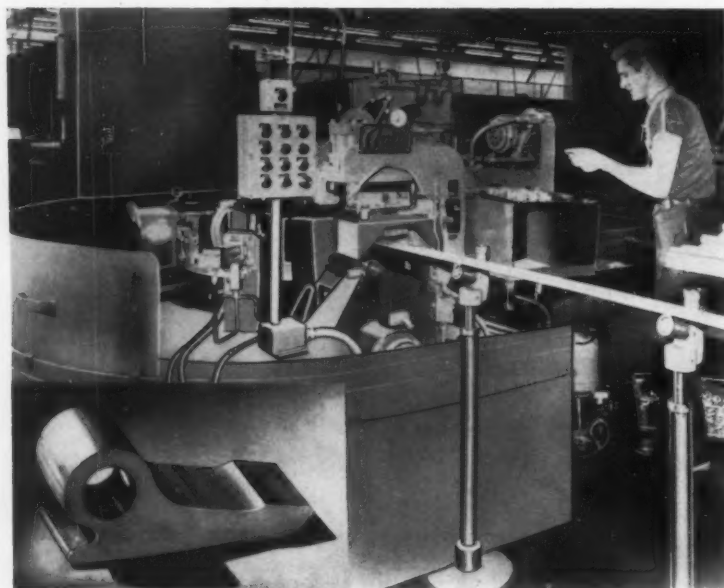
The Perkins Machine Co., Warren, Mass., has announced a new addition to its line of industrial presses. The new press, known as the No. 8 Model I, is a straight side flywheel type with a solid frame and a capacity of 80 tons. It is made to customer's specifications in both plain and geared types and is available with air clutches.



Straight side flywheel press for blanking and forming built by the Perkins Machine Co.

These presses can be used for a wide variety of work, such as blanking, forming, embossing, etc. They are equipped with bronze bushed main and pitman bearings and Timken roller-bearing flywheel. The presses are built in sizes ranging from 20 to 200 tons capacity.

Circle Item 131 on postcard, page 221



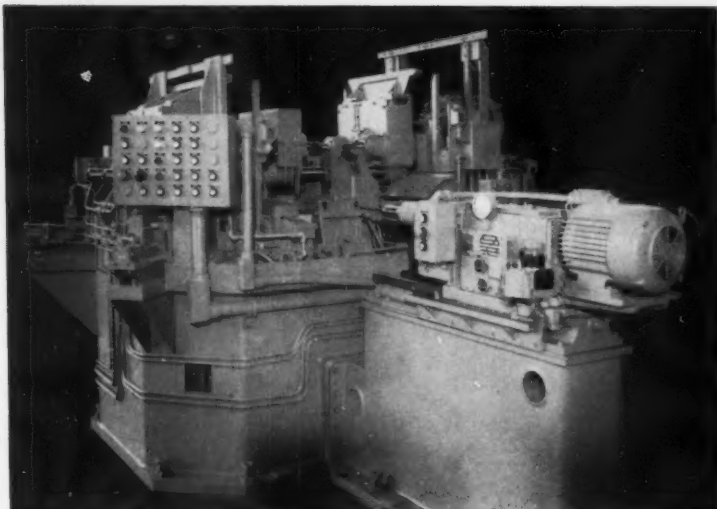
Cut-off and gun-drilling machine for producing parts from bar stock announced by Avey Division, Motch & Merryweather Machinery Co.

### Wilson Positioner and Assembly Stand

K. R. Wilson, Inc., Arcade, N. Y., has announced the development of a positioner and assembly stand which has a variety of industrial applications. The stand features a universal adapter plate to which any type fixture can be attached. This permits it to be used as a welding positioner and assembly stand for heavy industrial units. It can also be used for equipment maintenance and servicing. With its rugged, modern tubular design, the new stand safely handles work loads of over 1000 pounds. K. R. Wilson's Sure Control gear head allows the unit being welded or assembled to be positioned or turned to any convenient angle in a 360-degree rotation and stay locked in position.

Circle Item 132 on postcard, page 221





Machine for processing automotive part built by National Automatic Tool Co.

### Three-Way Machine for Drilling Automobile Frame

A three-way machine has been developed by the National Automatic Tool Co., Inc., Richmond, Ind., for drilling the front section of automobile frame assemblies to accurately match the cross members. The most unusual feature of this machine is a special horizontal unit with three heads. The outside heads have two stub spindles, each pointing toward the center, while the center head has two stub spindles on each side which point toward the outside heads. All heads have a common mounting base and move together, first in one direction to drill the cross members from one side, then in the opposite direction for drilling holes in the opposite side.

The welded frame assembly is brought to the machine by conveyor and the machine hydraulically lowers the part and clamps it in position. On starting the drilling cycle, two two-spindle drilling units come in from each side to combination drill and ream two holes 9/16 inch in diameter in the sides of the frame. At the same time the multi-head moves at right angles to drill, ream and chamfer four 7/8-inch holes in the cross members from one direction, then reverses its direction of movement to perform identical operations on the opposite sides of the cross members. Accuracy must be such that a rod 0.010 inch

undersize can be passed freely through holes in both cross members. On return of the heads to the starting position, the part is unclamped and elevated to the level of the conveyor. The machine cycle time is approximately sixty seconds for all operations.

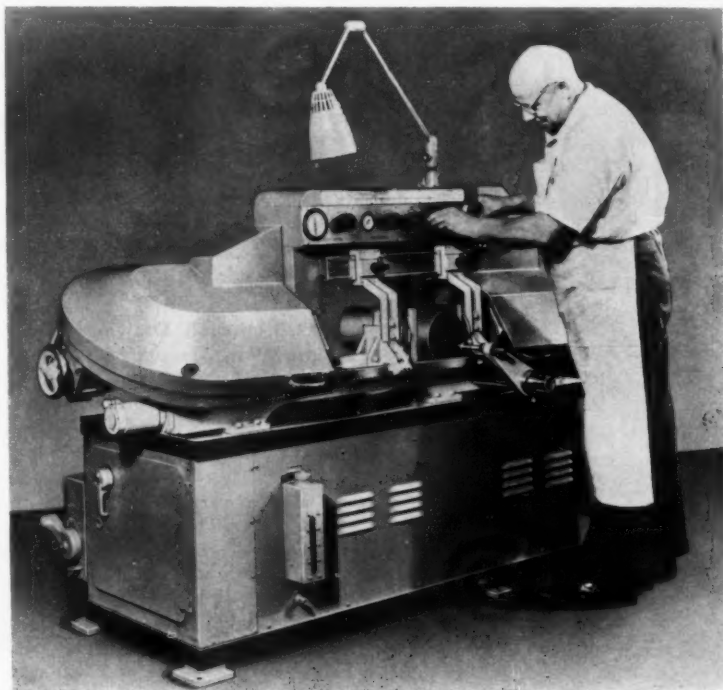
Circle Item 133 on postcard, page 221

### Heavy-Duty Band Saw for High-Speed Blades

A heavy-duty band-saw machine designed and built specifically to utilize high-speed steel band-saw blades has been announced by the Henry G. Thompson & Son Co., New Haven, Conn. Produced by the American Machine & Foundry Co. and jointly developed by AMF and Thompson engineers, this band saw will be known as the Milford Reziator Milband. The machine is designed to provide the rigidity and all-around ruggedness needed to withstand the wide range of blade speeds and the heavy feeds possible with modern high-speed steel band-saw blades.

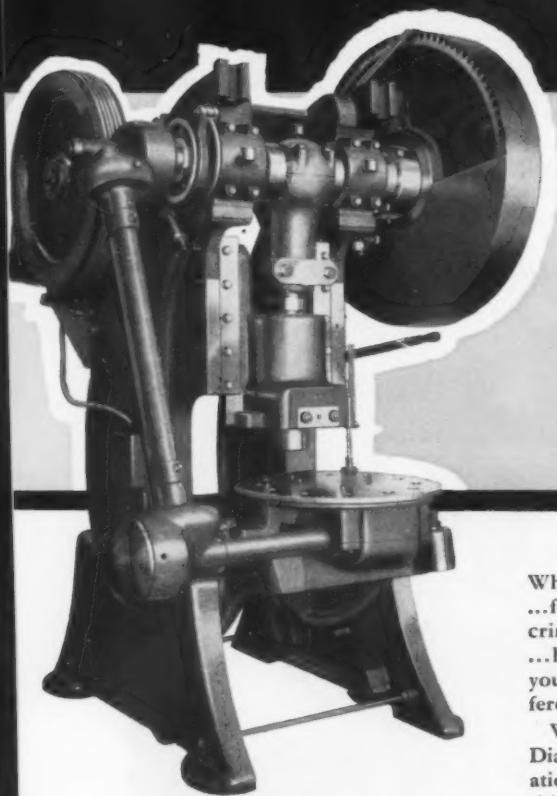
Blade speeds can be varied from 40 to 360 feet per minute, all machine motions being controlled from a single panel. Located immediately above the control panel is a job-selector chart that guides the operator in selecting the correct blade and speed for various sizes of stock and types of metal.

A hydraulic blade feed automatically compensates for the greater resistance the blade en-



"Milband" heavy-duty band saw

MODERN  
FEDERAL  
DIAL  
FEEDS  
have what  
it takes!



No. 7 Dial Feed  
Capacity, 80 tons

## VERSATILITY plus AUTOMATION

What's the job? Drawing...staking...forming...piercing...stamping...crimping...punching...broaching...burring...assembling? Maybe in your plant it's all of them, or a different, unique operation.

We'll lay two-to-one that Federal Dial Feeds are just what your operation needs. For the possibilities of this press with special jiggings are

practically unlimited. Add automatic feed and ejection and you have the answer to many cost problems.

Modernize now with Federals and eliminate the need for expensive, specialized equipment. Rugged, precision-built Federals embody the finest materials and workmanship. Available in sizes from 6 to 80 tons. *Write for new Dial Feed Catalog.*

**THE FEDERAL PRESS COMPANY**  
701 Division Street, Elkhart, Indiana

# **FEDERAL** DIAL FEED **PRESSES**

**32 Years' Experience in Dial Feed Engineering and Construction**

counters as it cuts into cross-sections of increasing thickness. Carbide-tipped, jam-proof guides give rigid blade support and transmit the heaviest feed pressures without damage to the blade. The band-saw blade is cleaned as it leaves the work by a high-pressure stream of coolant. In addition, another coolant stream removes the chips from the cutting area. A built-in coolant recirculating system is provided. The stock vise is hydraulically operated. It has a standard capacity of 10 by 10 inches and is constructed to permit adjustment of the work to a 45-degree cutting angle. An automatic indexing bar feed is available as an optional accessory.

Circle Item 134 on postcard, page 221

### Zagar Multi-Station Transfer Machine

Zagar, Inc., Cleveland, Ohio, has brought out a compact, seven-station transfer machine for machining gas burners prior to drilling holes. The standard tooling used in the machining sequence is readily adaptable to the processing of other parts. The machine drills, reams, taps, mills, and spot-faces the burner. Two stations, one for loading and one for unloading, together with the five working stations make a total of seven stations.

Movement of the burner from one station to another is done by a transfer bar. The movement is

continuous, hydraulically actuated, and interlocked. The first, second, and fifth stations use standard Zagar cam feed drill units. The third and fourth stations have standard Zagar gearless drill heads. The entire installation is automatic, with opportunity to automate loading and unloading. Production is rated at 180 burners per hour at 80 per cent efficiency.

Circle Item 135 on postcard, page 221

### Hufford Joggler with Stroke Adjustment

An improved, hydraulically operated joggler manufactured by the Hufford Corporation, El Segundo, Calif., can apply an adjustable-length stroke in any desired direction around a full circle in a vertical plane. Motion is imparted by an internal hydraulic ram which can be rotated in a vertical plane through a full 360 degrees. This ram forces the slideable half of the machine in any desired direction—up, down, horizontally, or at any intermediate angle. The direction of ram motion is adjusted manually by a crank. Direction of stroke is indicated on a dial linked with the ram-rotating mechanism.

To make any joggle the operator simply dials the correct stroke direction and adjusts the stroke length for thickness of stock. These facts are easily recorded and settings can thereafter be duplicated for reruns. Various



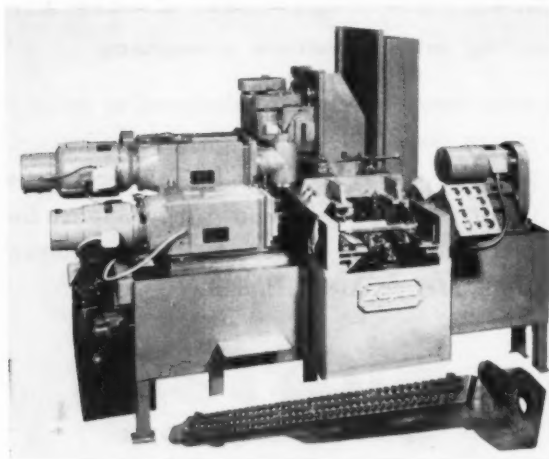
Joggler with universal stroke adjustment built by Hufford Corporation

workpiece shapes are gripped by first casting vise blocks from Cerro-Tru, a low melting point alloy. The vise jaws are hydraulically retracted after joggling to remove the workpiece. Maximum stroke length is 1/2 inch and the load capacity is 18,000 pounds. The unit is powered with a 1 1/2-hp, 60-cycle, 220-440-volt, 3-phase motor and weighs approximately 1200 pounds.

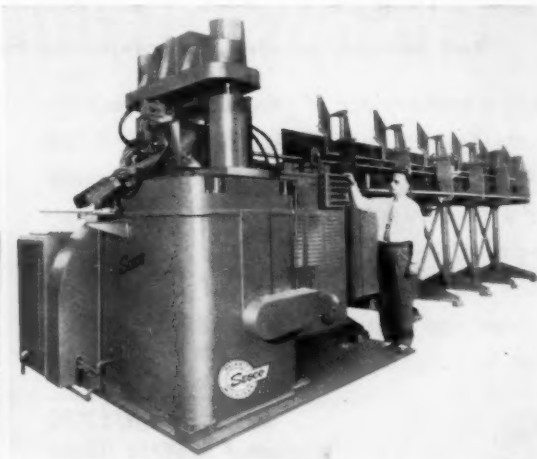
Circle Item 136 on postcard, page 221

### Sesco Precision Bar Feed and Cut-Off Machine

Sesco, Inc., Detroit, Mich., has introduced an exacting bar feed and cut-off machine that easily cuts 2-inch bar stock. This equipment is practically noiseless and (This section continued on page 236)



Zagar multi-station transfer machine equipped for processing gas burners



Bar feed and cut-off machine introduced by Sesco, Inc.

**STARRETT PRECISION MAKES GOOD PRODUCTS BETTER**



- New, long 50-division Vernier scales

- Flush fitting Vernier scales eliminate parallax errors

- Inside and outside scales on the same side for easy reading

- Extra long adjusting jaw for perfect squareness — rigid jaw construction

- Master bar hardened and stabilized for maximum rigidity

- Satin Chrome finish — glare-free, rust and stain resistant

**New STARRETT Satin Chrome MASTER-VERNIER CALIPER**  
**for faster, easier, error-proof reading with life-time accuracy**

Truly a masterpiece of precision toolmaking, this new Starrett No. 123 MASTER-VERNIER Caliper delivers a lifetime of easier, faster measuring with accuracy that is almost completely error-proof.

Your nearby Industrial Supply Distributor will show you this new MASTER-VERNIER Caliper in 12 and 24-inch sizes . . . also many

other new Starrett tools designed to make accuracy easy. Call him for quality products, dependable service. Or write for big, new Starrett Catalog No. 27 which shows the complete line. Address Dept. D, The L. S. Starrett Company, Athol, Massachusetts, U. S. A.



**Visit Booth 1730**  
**National Metals Show**

**Starrett®**

**PRECISION TOOLS**

*World's Greatest Toolmakers*

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK • HACKSAWS • HOLE SAWS • BAND SAWS • BAND KNIVES



## Wrought Aluminum Alloys in Order of Increasing Shearing Strengths

| Alloy and Temper | Shearing Strength, Pounds per Square Inch | Alloy and Temper | Shearing Strength, Pounds per Square Inch | Alloy and Temper | Shearing Strength, Pounds per Square Inch |
|------------------|---|------------------|---|------------------|---|
| 1100-O           | 9,000                                     | 2024-O           | 18,000                                    | 2218-T72         | 30,000                                    |
| 1100-H12         | 10,000                                    | Alclad 2024-O    | 18,000                                    | 6061-T6          | 30,000                                    |
| 1100-H14         | 11,000                                    | 3004-H34         | 18,000                                    | 6062-T6          | 30,000                                    |
| 3003-O           | 11,000                                    | 5052-O           | 18,000                                    | 2011-T3          | 32,000                                    |
| 5005-O           | 11,000                                    | 5357-H38         | 18,000                                    | 5056-H38         | 32,000                                    |
| 1100-H16         | 12,000                                    | 6063-T5          | 18,000                                    | 6151-T6          | 32,000                                    |
| 3003-H12         | 12,000                                    | Alclad 3004-H36  | 19,000                                    | 5056-H18         | 34,000                                    |
| 5357-O           | 12,000                                    | 3004-H36         | 20,000                                    | 2011-T8          | 35,000                                    |
| 6061-O           | 12,000                                    | Alclad 3004-H38  | 20,000                                    | 2025-T6          | 35,000                                    |
| Alclad 6061-O    | 12,000                                    | 5052-H32         | 20,000                                    | 2014-T3          | 37,000                                    |
| 6062-O           | 12,000                                    | 3004-H38         | 21,000                                    | 2014-T4          | 38,000                                    |
| 1100-H18         | 13,000                                    | 5052-H34         | 21,000                                    | 2017-T4          | 38,000                                    |
| 3003-H14         | 14,000                                    | 6063-T6          | 22,000                                    | 4032-T6          | 38,000                                    |
| 6063-T42         | 14,000                                    | 7075-O           | 22,000                                    | 2018-T61         | 39,000                                    |
| 3003-H16         | 15,000                                    | Alclad 7075-O    | 22,000                                    | Alclad 2024-T3   | 40,000                                    |
| Alclad 3004-O    | 15,000                                    | 5052-H36         | 23,000                                    | Alclad 2024-T4   | 40,000                                    |
| 3003-H18         | 16,000                                    | Alclad 6061-T4   | 23,000                                    | 2024-T3          | 41,000                                    |
| 3004-O           | 16,000                                    | 5052-H38         | 24,000                                    | 2024-T4          | 41,000                                    |
| Alclad 3004-H32  | 16,000                                    | 6061-T4          | 24,000                                    | Alclad 2024-T36  | 41,000                                    |
| 3004-H32         | 17,000                                    | 6062-T4          | 24,000                                    | 2014-T6          | 42,000                                    |
| Alclad 3004-H34  | 17,000                                    | 5056-O           | 26,000                                    | 2024-T36         | 42,000                                    |
| 2014-O           | 18,000                                    | 2117-T4          | 28,000                                    | Alclad 7075-T6   | 46,000                                    |
| 2017-O           | 18,000                                    | Alclad 6061-T6   | 29,000                                    | 7075-T6          | 48,000                                    |

Data supplied by Reynolds Metals Co.

# MACHINERY'S DATA SHEET

## Relative Formability and Mechanical Properties of Aluminum Alloys by Temper Groupings<sup>(1)</sup>

| Alloy <sup>(1)</sup><br>and<br>Temper <sup>(2)</sup> | Forming <sup>(3)</sup><br>Classification | Shear Strength         | Yield Strength | Ultimate<br>Tensile Strength | Elongation<br>Per Cent | Brinell<br>Hardness <sup>(4)</sup> |
|--|--|------------------------|----------------|------------------------------|------------------------|------------------------------------|
|  |  | Pounds per Square Inch |                |                              |                        |                                    |
| ANNEALED GROUP                                       |  |                        |                |                              |                        |                                    |
| 1100-O   | CLASS I                                  | 9,000                  | 5,000          | 13,000                       | 35                     | 23                                 |
| 2014-O   | CLASS II                                 | 18,000                 | 14,000         | 27,000                       | 21                     | 45                                 |
| 2024-O   | CLASS II                                 | 18,000                 | 11,000         | 27,000                       | 20                     | 47                                 |
| 3003-O   | CLASS I                                  | 11,000                 | 6,000          | 16,000                       | 30                     | 28                                 |
| 3004-O   | CLASS IV                                 | 16,000                 | 10,000         | 26,000                       | 20                     | 45                                 |
| 5005-O   | CLASS I                                  | 11,000                 | 6,000          | 18,000                       | 30                     | 28                                 |
| 5050-O   | CLASS II                                 | 15,000                 | 8,000          | 21,000                       | 24                     | 36                                 |
| 5052-O   | CLASS III                                | 18,000                 | 13,000         | 28,000                       | 25                     | 45                                 |
| 5086-O   | CLASS V                                  | 23,000                 | 17,000         | 38,000                       | 22                     | 60                                 |
| 5154-O   | CLASS IV                                 | 22,000                 | 17,000         | 35,000                       | 27                     | 58                                 |
| 5357-O   | CLASS II                                 | 12,000                 | 7,000          | 19,000                       | 25                     | 32                                 |
| 6061-O   | CLASS II                                 | 12,000                 | 8,000          | 18,000                       | 25                     | 30                                 |
| 7075-O   | CLASS V                                  | 22,000                 | 15,000         | 33,000                       | 17                     | 60                                 |
| 1/4-HARD TEMPER GROUP                                |  |                        |                |                              |                        |                                    |
| 1100-H12   | CLASS I                                  | 10,000                 | 15,000         | 16,000                       | 12                     | 28                                 |
| 3003-H12   | CLASS I                                  | 12,000                 | 18,000         | 19,000                       | 10                     | 35                                 |
| 3004-H32   | CLASS IV                                 | 17,000                 | 25,000         | 31,000                       | 10                     | 52                                 |
| 5005-H12   | CLASS I                                  | 14,000                 | 19,000         | 20,000                       | 10                     | 36 <sup>(7)</sup>                  |
| 5050-H32   | CLASS II                                 | 17,000                 | 21,000         | 25,000                       | 9                      | 46                                 |
| 5052-H32   | CLASS III                                | 20,000                 | 28,000         | 33,000                       | 12                     | 62                                 |
| 5086-H32   | CLASS V                                  | 25,000                 | 30,000         | 42,000                       | 12                     | 75                                 |
| 5154-H32   | CLASS IV                                 | 22,000                 | 30,000         | 39,000                       | 15                     | 67                                 |
| 5357-H32   | CLASS II                                 | 13,000                 | 19,000         | 22,000                       | 9                      | 40                                 |
| 1/2-HARD TEMPER GROUP                                |  |                        |                |                              |                        |                                    |
| 1100-H14   | CLASS I                                  | 11,000                 | 17,000         | 18,000                       | 9                      | 32                                 |
| 3003-H14   | CLASS I                                  | 14,000                 | 21,000         | 22,000                       | 8                      | 40                                 |
| 3004-H34   | CLASS IV                                 | 18,000                 | 29,000         | 35,000                       | 9                      | 52                                 |
| 5005-H14   | CLASS I                                  | 14,000                 | 22,000         | 23,000                       | 6                      | 41 <sup>(7)</sup>                  |
| 5050-H34   | CLASS II                                 | 18,000                 | 24,000         | 28,000                       | 8                      | 53                                 |
| 5052-H34   | CLASS III                                | 21,000                 | 31,000         | 38,000                       | 10                     | 67                                 |
| 5086-H34   | CLASS V                                  | 27,000                 | 37,000         | 47,000                       | 10                     | 80                                 |
| 5154-H34   | CLASS IV                                 | 24,000                 | 33,000         | 42,000                       | 13                     | 73                                 |
| 5357-H34   | CLASS II                                 | 13,000                 | 22,000         | 25,000                       | 8                      | 45                                 |
| 3/4-HARD TEMPER GROUP                                |  |                        |                |                              |                        |                                    |
| 1100-H16   | CLASS I                                  | 12,000                 | 20,000         | 21,000                       | 6                      | 38                                 |
| 3003-H16   | CLASS I                                  | 15,000                 | 25,000         | 26,000                       | 5                      | 47                                 |
| 3004-H36   | CLASS IV                                 | 20,000                 | 33,000         | 38,000                       | 5                      | 70                                 |
| 5005-H16   | CLASS I                                  | 15,000                 | 25,000         | 26,000                       | 5                      | 46 <sup>(7)</sup>                  |
| 5050-H36   | CLASS II                                 | 19,000                 | 26,000         | 30,000                       | 7                      | 58                                 |
| 5052-H36   | CLASS III                                | 23,000                 | 35,000         | 40,000                       | 8                      | 74                                 |
| 5154-H36   | CLASS IV                                 | 26,000                 | 36,000         | 45,000                       | 12                     | 78                                 |
| 5357-H36   | CLASS II                                 | 17,000                 | 26,000         | 28,000                       | 7                      | 51                                 |
| FULL-HARD TEMPER GROUP                               |  |                        |                |                              |                        |                                    |
| 1100-H18   | CLASS I                                  | 13,000                 | 22,000         | 24,000                       | 5                      | 44                                 |
| 3003-H18   | CLASS I                                  | 16,000                 | 27,000         | 29,000                       | 4                      | 55                                 |
| 3004-H38   | CLASS IV                                 | 21,000                 | 36,000         | 41,000                       | 5                      | 77                                 |
| 5005-H18   | CLASS I                                  | 16,000                 | 28,000         | 29,000                       | 4                      | 51 <sup>(7)</sup>                  |
| 5050-H38   | CLASS II                                 | 20,000                 | 29,000         | 32,000                       | 6                      | 63                                 |
| 5052-H38   | CLASS III                                | 24,000                 | 37,000         | 42,000                       | 7                      | 85                                 |
| 5154-H38   | CLASS IV                                 | 28,000                 | 39,000         | 48,000                       | 10                     | 80                                 |
| 5357-H38   | CLASS II                                 | 18,000                 | 30,000         | 32,000                       | 6                      | 55                                 |
| HEAT-TREATED TEMPER GROUP                            |  |                        |                |                              |                        |                                    |
| 2014-T6  | CLASS III                                | 42,000                 | 60,000         | 70,000                       | 10 <sup>(6)</sup>      | 135                                |
| 2024-T3  | CLASS II                                 | 41,000                 | 50,000         | 70,000                       | 18                     | 120                                |
| 6061-T6  | CLASS I                                  | 30,000                 | 40,000         | 45,000                       | 12                     | 95                                 |
| 7075-T6  | CLASS IV                                 | 48,000                 | 73,000         | 83,000                       | 11                     | 150                                |

<sup>(1)</sup>All mechanical properties are typical. Elongations are based on 2-inch gage length on 1/16 inch thick specimens.

<sup>(2)</sup>Alclad alloys are not listed. If considered, use the same forming classification as shown for the bare alloys. Mechanical properties of Alclad alloys are slightly less than those of the same bare alloy. Elongations are about the same.

<sup>(3)</sup>Mechanical properties of "F" tempers are not guaranteed, therefore these are intentionally omitted.

<sup>(4)</sup>Class I rated material has best formability in its respective temper group, Class II is next best, etc.

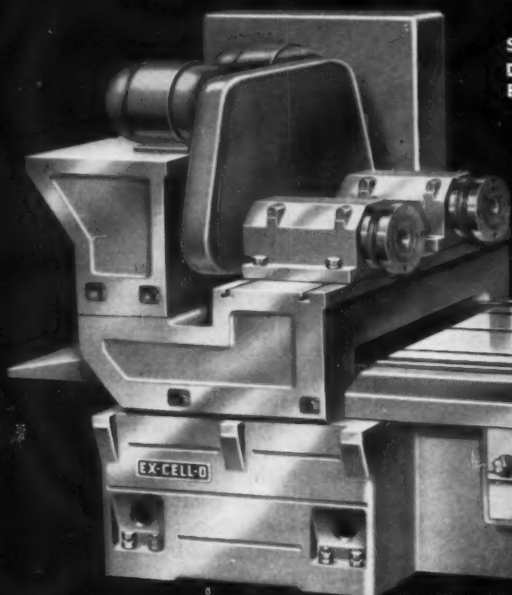
<sup>(5)</sup>500 Kg. load — 10-mm. ball.

<sup>(6)</sup>For Alclad 2014-T6.

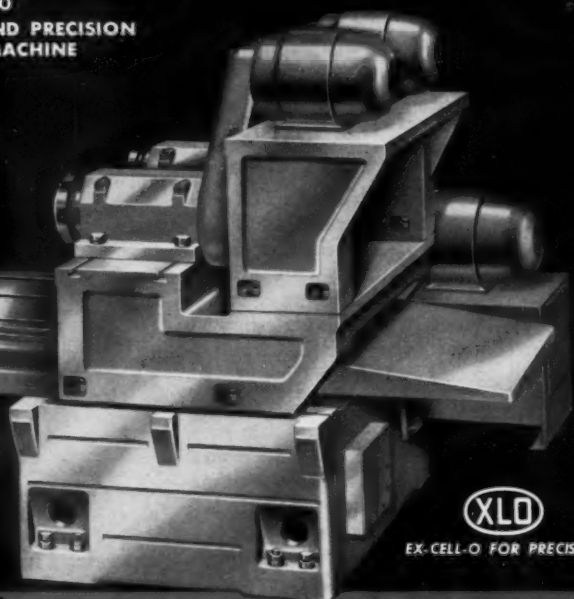
<sup>(7)</sup>Applicable when material reaches a stabilized state.

Compiled by Reynolds Metals Co.

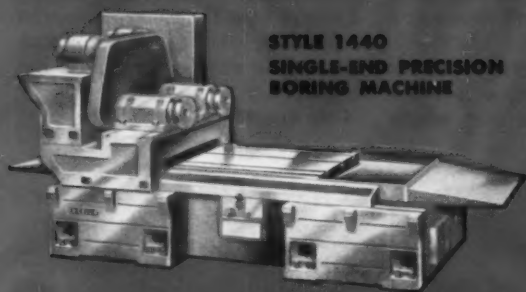
# announcing



**STYLE 2440  
DOUBLE-END PRECISION  
BORING MACHINE**



EX-CELL-O FOR PRECISION



**STYLE 1440  
SINGLE-END PRECISION  
BORING MACHINE**

## TWO NEW HEAVY DUTY PRECISION BORING MACHINES

57-76

**EX-CELL-O BORING MACHINES** perform better because of deep-down solid construction, high precision and exceptional versatility. The minute you put one to work profits go up, operating costs go down. And these two new additions to the Ex-Cell-O line are no exceptions:

**DOUBLE-END STYLE 2440:** This new double-end Ex-Cell-O machine, designed for large workpieces, combines capacity and rigidity for bulky parts while allowing for multiple-station high production work on smaller parts. Spindle bridges can be moved together or spread apart to suit the workpiece.

**SINGLE-END STYLE 1440:** This new heavy-duty precision boring machine is identical to the 2440 (above) except that it is equipped with one bridge for single-end operations.

Whichever model fits your particular production

requirements—you'll find their rugged versatility performs a wide range of rough, semi-finish, and finish operations which lowers your per-unit costs, increases your potential profit.

For further information, call your local Ex-Cell-O Representative. He'll provide all the facts about these two new machines. Or, write direct to Ex-Cell-O.

**EX-CELL-O** Machinery  
CORPORATION  
DETROIT 32, MICHIGAN Division

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

operates with a minimum of shock or vibration. It cuts parts accurately with respect to both length and weight, and leaves practically no scrap. Parts cut off from a machine-finished bar can be held to a specified weight within a tolerance of 1/10 ounce.

The bar feed and cut-off consists of a bar stock storage rack and loader, a hydraulic-gripper bar feed, and a short-stroke underdrive cut-off unit. These self-contained units are of heavy-duty welded-steel construction. The entire assembly is constructed to receive and process bars of random lengths, and, with minor changes, will process bars of various diameters. The model shown in the accompanying illustration will process bars from 1 inch to 2 inches in diameter, and features a 175-ton cut-off.

Bars of stock are first loaded on the bar storage rack. The operator pushes a button, and one bar is automatically fed from the rack to the bar-loading rolls. The loading rolls then carry the bar forward through the feed and to the bar cut-off gage, engaging the stock retainer, cycling the cut-off unit, and disposing of the scrap, all automatically.

Circle Item 137 on postcard, page 221

## Electric Erosion Machine with Grinding Attachment

The Electro-Spark Co., Inc., New York City, is introducing the latest model of its E-400 electric erosion machine, Fig. 1, which in-

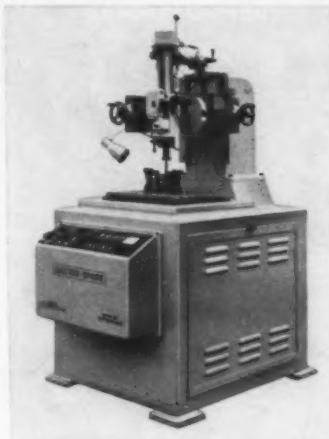


Fig. 1. Electro-Spark erosion machine

corporates a new erosion-grinding attachment, Fig. 2. A small motor, located at the top of the main spindle, rotates the electrode at a speed of 50 rpm.

A second servomotor has been applied to the machine in addition to the regular one which

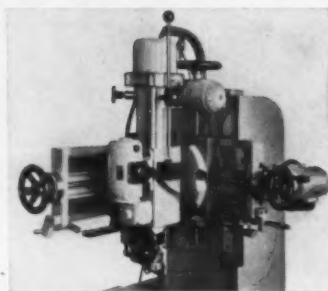


Fig. 2. Erosion-grinding attachment

commands the vertical automatic feed. The second servomotor is mounted on a swivel arrangement and can be swung into mesh with a gear that moves the transverse slide of the machine.

Erosion grinding is performed by a copper or brass wheel mounted on the main spindle of the machine. The grinding servomotor provides the necessary automatic horizontal feed. With this new attachment the Electro-Spark machine can be used for all types of electric erosion jobs, from die-sinking to grinding. When cutting a round hole, the electrode can be rotated to obtain more uniform, as well as reduced, wear on the electrode.

Circle Item 138 on postcard, page 221



Equipment available for use in application of electronic system of precision measurement developed by Federal Products Corporation

## Federal Electro-Probe for Precision Measurements

Equipment for its new electronic system of precision measurement has been announced by Federal Products Corporation, Providence, R. I. The basic unit of this system is a small-size, hermetically sealed gage head, known as the "Electro-Probe," which provides unusual operating characteristics. The amplitude of the continuously produced electronic signal of this equipment maintains such exact linear relationship to contact movement that available electrical instruments do not have sufficient sensitivity to measure the error.

The Electro-Probe head, measuring approximately 1 1/2 by 2 1/2 by 1/2 inch, can be used with various types of contacts and contact mountings—depending on the over-all accuracy required—



and can be operated with any one of several types of amplifiers according to application needs. Gage heads are interchangeable and may be employed jointly or in rapid succession by means of specially designed switching arrangements.

The electronic test indicator, designated Model 23OP-2, includes the Electro-Probe gage head and a lightweight, completely portable, battery-powered transistor amplifier and accessories. It is quickly applied to precision measurement on sur-

face plate or machine and is particularly suited to general inspection and patrol inspection applications. Two ranges are instantly available by switching—0.004-inch range with 0.0001-inch graduations or 0.002-inch range with 0.00005-inch graduations. Gaging pressure is uniform throughout the range; actual change is less than 0.1 gram per 0.001-inch movement of the clutch-mounted contact which has a total friction-free travel tolerance of  $\pm 0.060$  inch.

Circle Item 139 on postcard, page 221

### Longhorn All-Steel Hydraulic Presses

The Perry Co., Waco, Tex., has announced a completely new line of all-steel hydraulic presses to be marketed under the trade name of "Longhorn." Standard presses are currently being produced in 160- to 1500-ton capacity sizes. Special presses built to customer specifications and capacities are also available.

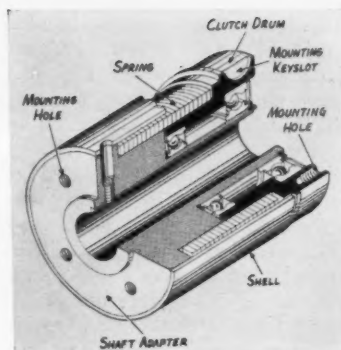
Longhorn presses are designed to handle all metal-forming operations and to trim and punch vacuum-formed plastics, as well

as other materials. All of the presses in this line are equipped with NEMA 12 or JIC standard electrical circuits.

Circle Item 140 on postcard, page 221

### "Precision-spring" Clutches

Two complete lines of standard over-running "Precision-spring" clutches have been introduced by the Marquette Division of Curtiss-Wright Corporation, Cleveland, Ohio. One line consists



Cut-away view of Curtiss-Wright over-running clutch

of ball-bearing clutches ranging from 20 to 3000 pound-foot torque capacity; the other line is made with sleeve or plain bearings in 8-pound-inch to 200-pound-inch torque capacity. These standard clutches are suited for all over-running, indexing, and backstopping applications. In most applications, the original lubrication is sufficient for the life of the clutch.

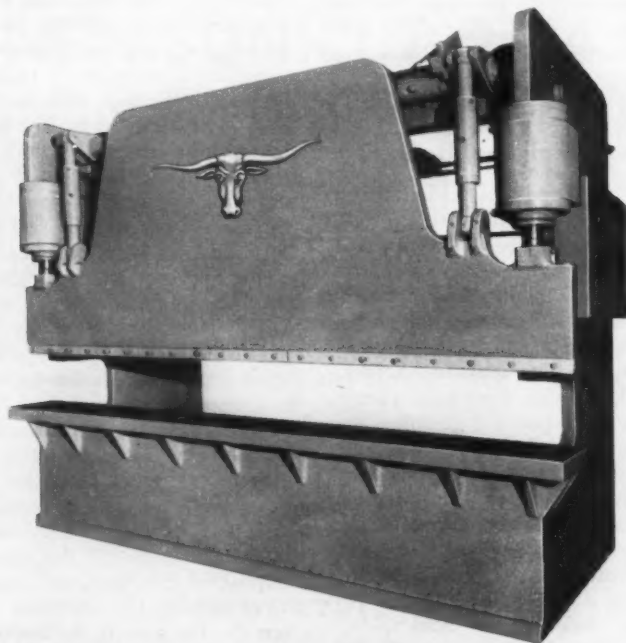
In relation to their torque capacity, these positive-action clutches are compact and lightweight. For example, a ball-bearing clutch with a torque capacity of 50 pound-feet weighs 5 pounds, has an outside diameter of 2 3/4 inches, and an over-all length of 3 1/2 inches. The smallest of the sleeve-bearing clutches, with a torque capacity of 8 pound-inches, weighs 1/3 ounce, and measures 7/16 by 11/16 inch.

The rated speed for the smaller sizes, in both ball-bearing and sleeve-bearing types, is 3600 rpm. The largest ball-bearing clutch transmits 3000 pound-feet of torque at a speed of 1200 rpm, and the largest sleeve-bearing clutch transmits 200 pound-inches at 2400 rpm.

Circle Item 141 on postcard, page 221

### Potter & Johnston High-Speed Automatic Turret Lathe

An automatic turret lathe, designed for high-speed production of heavy components, is now being manufactured by Potter & Johnston Co., Pawtucket, R. I., a subsidiary of Pratt & Whitney Co., Inc., West Hartford, Conn.



All-steel hydraulic press brake of Longhorn line placed on the market by the Perry Co.

This lathe has been designated the Model 8-U. It has a 40-inch diameter swing over the bed ways, chucks work up to 30 inches in diameter and has a 50-hp motor.

The new machine is rated as intermediate in size between the company's present 6DREL and 10-U models and has been brought out to meet the demand for a large, heavy-duty automatic turret lathe with the extra speed and power needed for fast removal of tough alloy metals. It is said to have wide application in the manufacture of agricultural, earth-moving, and transportation equipment, large electrical motors, aircraft engines, airframes, and many other similar products.

The Model 8-U is ruggedly constructed throughout with a heavy steel weldment base for maximum rigidity. There is a wide range of speeds and feeds with four automatic speed changes and three automatic feed changes for each set of pick-off gears.

Circle Item 142 on postcard, page 221



Fig. 1. Improved tool-holder announced by Carmet Division of the Allegheny Ludlum Steel Corporation

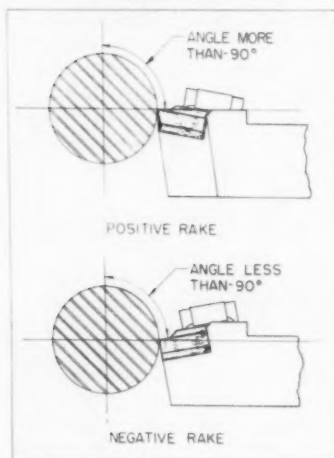
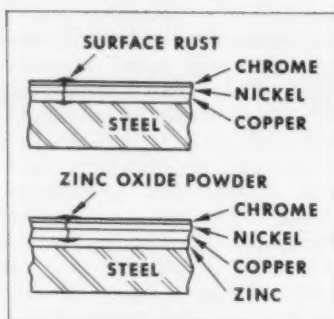


Fig. 2. Positive and negative rake tools recently added to the Carmet line



Diagrams illustrating old and new methods of chromium plating steel

### Zinc-Base Chromium Plate Developed to Prevent Rust

A method of preventing rust from forming on chrome plate steel surfaces of such items as automotive trim and household appliances has been announced by Wagner Bros. Inc., Detroit, Mich. Basically, the method, which is still undergoing tests, involves the use of a zinc-base plate in the copper-nickel-chrome plating sequence as shown in the lower view of the illustration.

The plating process apparently prohibits the molecular blending of the zinc and copper-plating layers and thus prevents the formation of any sub-surface gap, eliminating the possibility of surface cracks and peeling.

Circle Item 143 on postcard, page 221

### Improved Tool-Holders

An improved tool-holder and an increase in the number of tool-holder styles for use with cemented carbide indexable inserts have been announced by the Carmet Division of the Allegheny Ludlum Steel Corporation, Pittsburgh, Pa. The new tool-holder, Fig. 1, has an improved clamp which has a positive gripping action, greater chip clearance, and better chip control than preceding models. The clamp can be used with or without the chip breaker. The clamp screw is accessible from both top and bottom of the holder.

The number of tool-holder styles has been increased by twenty-six with the addition of positive rake type holders such as shown by the upper view in Fig. 2.

Previously there were more than ninety styles and sizes in the negative rake type shown in the lower view. All of the more than 116 styles and sizes will utilize the new clamp. Ten new positive rake inserts have also been added to the Carmet line. Positive rake cutting means that the top surface of the cutting tool approaches the work-piece at an angle greater than 90 degrees, while the negative rake tool approaches the work at an angle less than 90 degrees.

Positive rake tools are used primarily for the softer alloys such as aluminum and brass, and for some ferrous materials where the work-piece shape requires the application of less cutting pressure than that generated by negative rake tools.

Circle Item 144 on postcard, page 221

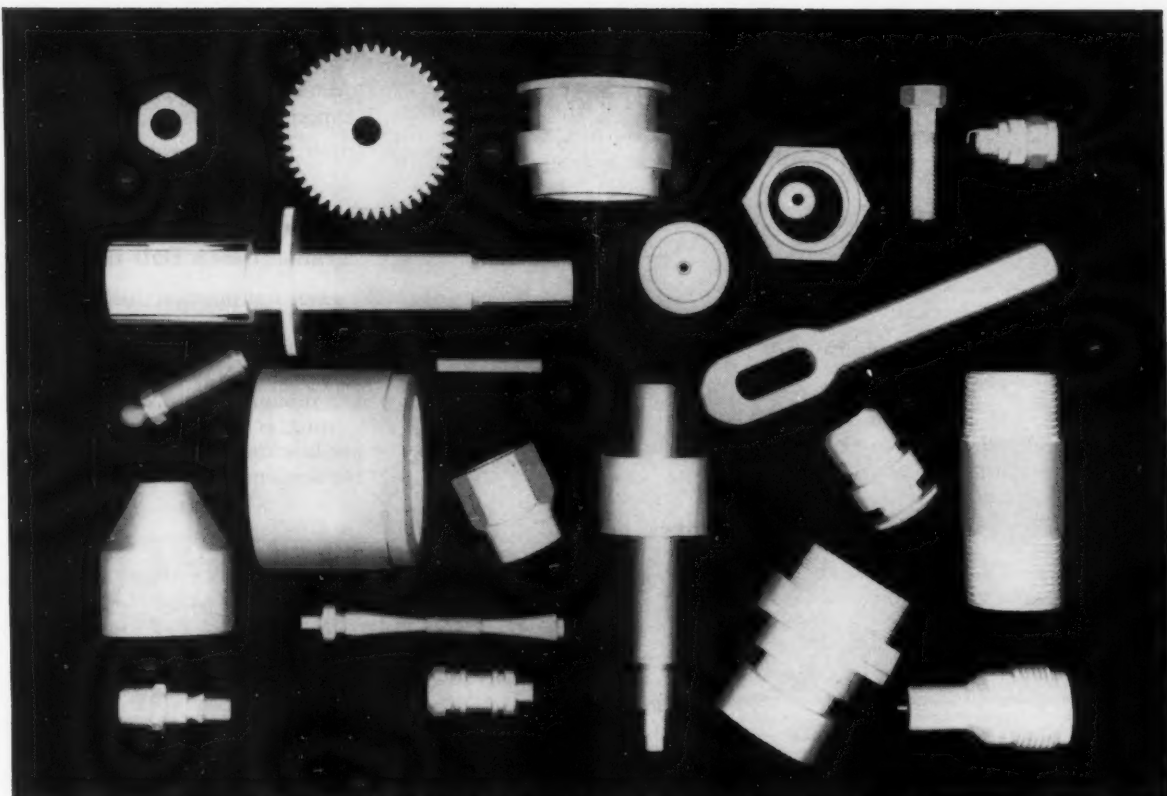
### "TorqueTrol" Automatic Machine Control

Machines can operate unattended when they are "supervised" by the "TorqueTrol" automation device developed by the Electronic Control Corporation, Detroit, Mich. In addition to controlling the tool feed, this device detects jamming, tool wear, faulty lubrication, etc., and stops the machine or sounds an alarm. Connected to a recorder, it registers the length of time the tool has been in use and indicates when the machine performed work and when it idled. Further, if connected to a counter, it counts the machine's work strokes and thus the number of parts produced.

This unit can also tell when a pump is gummed up or overloaded; control the rhythm of step-drilling; start the chip-clearing cycle; tell when the capacity of a conveyor is reached; and warn of excessive die pressure.

Any abnormal condition in the machine operation increases the torque and load on the motor shaft. This causes an increase in the power used by the motor. TorqueTrol monitors the electric power, detects this increase, and stops the machine in milliseconds—long before an operator could press the stop button.

Circle Item 145 on postcard, page 221  
(This section continued on page 240)



**ONE OIL, MANY METALS.** Moderately priced Sunicut 5534 gave uniformly excellent results in the machining of this wide variety of top-quality steel parts.

*Designed especially for job shops...*

## NEW SUNICUT 5534 CAN BE USED ON A WIDE VARIETY OF STEELS

SUNICUT® 5534 ends your search for a single cutting oil that can assure quality machining of a wide variety of ferrous metals...ranging from B1112 to 4130 and including free-machining stainless steels.

A non-emulsifying, transparent cutting oil, Sunicut 5534 can speed production of general screw machine and turret lathe work. It gives excellent finish in tapping, drilling, threading, and light stamping operations and can be used on many special jobs run at both high and low speeds.

Try moderately-priced Sunicut 5534. It can save you money by reducing your cut-

ting oil inventories and oil change time. It can boost your production and profits.

For detailed information, prices and delivery data about this new, versatile cutting oil, call your Sun representative today. Or write directly to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. M-11.



**INDUSTRIAL PRODUCTS DEPARTMENT**

**SUN OIL COMPANY Philadelphia 3, Pa.**

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

©SUN OIL COMPANY

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—239



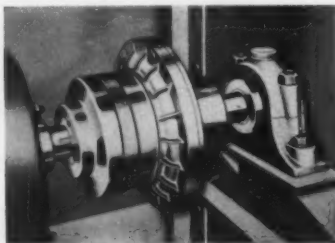
### Magnaflux Electronic Crack Detector

ED-500 eddy-current instrument specifically designed to find defects in spark-plug ports of aluminum aircraft cylinders. This instrument, together with an SO-200 portable Sonizon lightweight unit that gives a direct reading of thickness from 0.025 inch to 5.00 inches, was exhibited at the recent Instrument-Automation Show in Cleveland by the Magnaflux Corporation, Chicago, Ill.

Circle Item 146 on postcard, page 146

### Large-Size Flexidyne Drive

Large-size drive developed by the Dodge Mfg. Corporation, Mishawaka, Ind., to increase the power-transmitting range of its



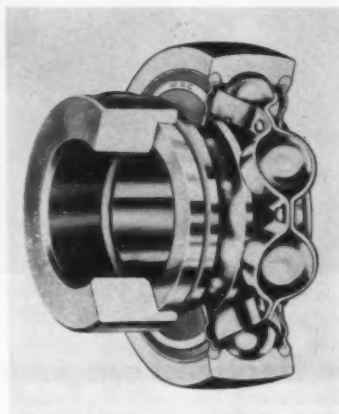
Flexidyne dry fluid drives by 50 per cent. The new larger Flexidyne drive is recommended for use with motors rated up to 75 hp at 1750 rpm. Operating advantages of the new drives are the same as those of smaller sizes which are being used in thousands of industrial applications

where smooth starting, 100 per cent efficiency at full load, and protection against overload are important factors.

Circle Item 148 on postcard, page 221

### Marlin-Rockwell Power Transmission Ball Bearings

Power transmission ball bearing of new RA series brought out by the Marlin-Rockwell Corporation, Jamestown, N. Y. These bearings are designed for installations requiring economical mounting of pre-lubricated bearings which will require minimum maintenance



and have maximum protection against entrance of dirt and moisture. They fit standard pressed steel flange housings, and the bores will fit commercially ground inch shafting. Bearings of this type are widely used in agricultural equipment, such as field harvesters, combines, corn pickers, and other similar equipment. A standard eccentric collar is used to lock the bearing firmly to the shaft, eliminating the need for press fits, lock nuts, or other locking devices. The bearings are made with either a cylindrical or spherical outer ring. The spherical outer ring allows the bearing to adjust itself in a corresponding spherical housing seat, thus permitting reasonable shaft misalignment without damage to the bearing.

Circle Item 149 on postcard, page 221

(This section continued on page 242)

### Welding Blowpipe with Wide Work Range

Medium-pressure Oxxweld W-47 welding blowpipe capable of welding metal of any thickness from 28 gage to 3 inches and handling heating jobs requiring total gas flows up to 1500 cubic feet per hour introduced by the Linde Co., Division of Union Carbide Corporation, New York City. With its complete selection of welding and heating heads, extensions, and accessories, the new blowpipe is said to have the widest welding and heating range ever available in a single blowpipe. It handles any oxygen or acetylene flow from 2 to 300 cubic feet per hour. A simple change of welding heads

quickly converts the new blowpipe from light-duty welding and brazing to heavy-duty welding or heating, thus making it possible to handle a range of work normally requiring two or more blowpipes. A convenient cutting attachment equips the blowpipe for flame-cutting on metal up to 8 inches thick. Each of the 42 welding and heating heads available for use with the new blowpipe has an individual cartridge type mixer that provides thorough mixing and proportioning of gas, thus assuring soft and stable welding flames.

Circle Item 147 on postcard, page 221





Boring operation on 24" aluminum microwave component. Note complicated set-up made simple with HURTH tilttable worktable. Deep throat of machine saves set-up time... saves cutters, too.



PHOTOGRAPHED AT L. H. TERPENING CO.

can  
you  
match  
these

savings...in your boring and milling operations?



Close tolerance boring in gear box housing.  
Note optical reading devices at right.

#### 65% saving in set-up and production time at RAYTHEON

*"The HURTH V10a performs both jig boring and milling operations that would cost us three times as much on other type equipment. We find it flexible for short runs and equally reliable and consistent for long runs."*

says Albert Waldstein, Mgr., Machine Design and Fabrication, RAYTHEON MANUFACTURING CO.

#### 25-50% saving in toolroom and small lot production at TERPENING

*"The HURTH V10a cut our jig boring and milling time up to 50% compared to equipment formerly used. It's the first machine we turn to for close-limit tooling and small lot production and it does work not possible on our other machines. In jig boring with the HURTH, we locate and size holes within .0002".*

says E. J. Friebele, Chief Engineer, L. H. TERPENING CO.

Both agree—as do all other HURTH users—that there's no precision tool so economical to run when complicated set-ups with many tool changes are required. For the HURTH combines vertical milling, downfeed milling and jig boring in one machine—performs these *three different operations* to close tolerances with one set-up of the work. Large optical reading devices facilitate quick, accurate coordinate settings. You merely change table settings and cutting tools for:

VERTICAL MILLING—using longitudinal traverse of worktable, which can be tilted 15° to front or rear.

DOWNFEED MILLING—using longitudinal traverse of worktable and graduated downfeed of cutting spindle.

JIG BORING—using continuous spindle downfeed, varied in extremely small steps.

Match the savings other HURTH users are getting—in your toolroom—on your production line. Talk it over with one of our sales engineers. Write for details.



# KURT ORBAN

COMPANY, INC.

42 Exchange Place, Jersey City 2, N. J. • In Canada: 2490 Eglinton Ave. W, Toronto



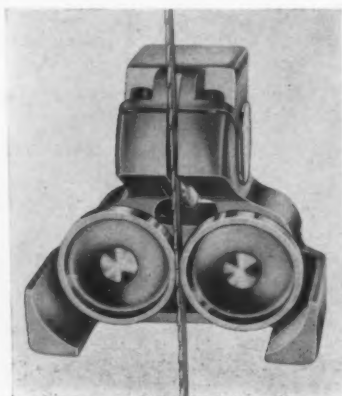
### Rotary-Motion Power Cylinder

Hydraulic- or pneumatic-pressure power cylinder designed to transmit rotary motion announced by Thompson Products, Inc., Michigan Division, Warren, Mich. Versatility with respect to applications, ease of installation, compactness, and efficiency of operation are advantages claimed for this new unit. It can be used wherever hydraulic or pneumatic pressure is available. Operating from 600 to 1000 psi, it delivers approximately 26,000 inch-pounds torque output. Overrunning clutches, gears, sprockets, etc., are easily adapted to the output shaft to increase versatility.

Circle Item 150 on postcard, page 221

### Carter Band Saw Guide

Band saw guide designed on a radically new principle and guaranteed to operate satisfactorily on saws cutting any material at any speed or load. This guide, produced by Carter Products Co., Inc., Grand Rapids, Mich., is patented under the name of Carter Guidall 400. It is said to be the first guide in which the edge of the blade rides on the outside perimeter of the thrust wheel and with thrust wheel and support



rollers all operating on the inner raceway of the bearing. The guide will handle blade speeds up to 15,000 feet per minute. It is said to work equally well on light and heavy loads and will handle thrust loads up to 175 pounds at maximum speeds and up to 500 pounds at lower speeds. It uses saw blades from 3/16 inch to 2 1/2 inches wide. For applications requiring a wiping action on the blade the new guide is offered with support blocks instead of rollers. The unit may be converted from a support wheel to a block setup by simply replacing the wheels with support blocks.

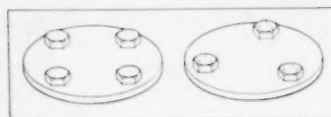
Circle Item 151 on postcard, page 221



### "Appraisor" that Informs Buyer If New Equipment Will Pay for Itself

An "Appraisor" developed to help businessmen make sure that every piece of new equipment purchased will pay for itself in a reasonable length of time, announced by Van D. Mark, Mount Clemens, Mich. The "Appraisor" is designed to prevent the purchase of white elephant equipment and make sure that only money-saving machines or devices are acquired. Originally developed to help the owner of a small company make faster, better equipment purchasing decisions, it makes use of a formula that is not new but laborious to apply without the aid of the new device. Thus the "Appraisor" will save time for buyers of new equipment when analyzing various proposals for the purchase of equipment. Sellers of equipment can also use the device to emphasize value of their products.

Circle Item 152 on postcard, page 221



### Three Bolts Do Work of Four

Three high-strength bolts positioned 120 degrees apart around a common center, as shown at right, will provide as stable a joint as the conventional pattern of four standard bolts arranged symmetrically, as at left, according to Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y., manufacturers of the high-strength bolts. Use of the new bolts makes savings in assembly possible because fewer holes need to be drilled and fewer bolts inserted. The high-tensile strength bolts, identified by three radial dashes on the bolt head, have a tensile strength rating of 120,000 psi. Cap-screws, identified by their bright finish, are produced to rigid dimensional tolerances and are rated at 68,000 psi tensile strength. Machine bolts have a tensile strength of 55,000 psi. As the least expensive per piece, the latter bolts are recommended where their strength is sufficient, and use of stronger bolts would not reduce the number required.

Circle Item 153 on postcard, page 221

### Monochromatic Light for Checking Surface Flatness

Improved monochromatic light for measuring flatness introduced by the Lapmaster Division of



Check...

# COST-PER-PIECE

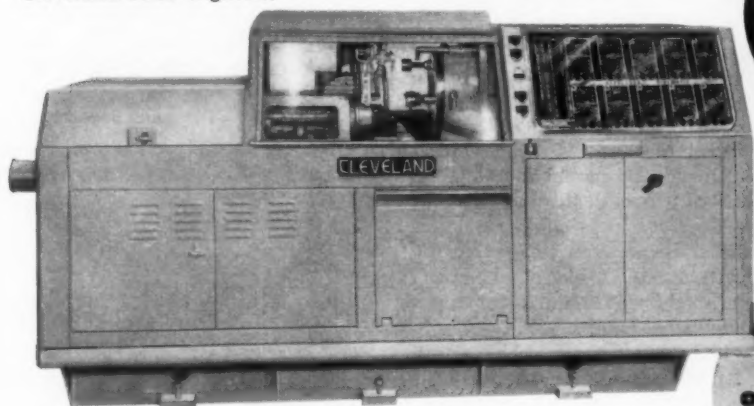
...it's usually **LESS** on the  
NEW 1 3/8" or 1 5/8" model AB

## CLEVELAND DIALMATIC

Analyze each of your jobs on its own. Figure it on a new 1 3/8" or 1 5/8" Model AB Cleveland Dialmatic single spindle automatic, and compare the best other methods you can use. Chances are you will get a much lower unit cost on the Cleveland—even on runs as small as 50 pieces!

Dial control is the answer. With this new Cleveland you save set-up time because there are *no change gears, no special cams to install*. You simply *set the dials* to pre-select any tool feed or spindle speed that you want, forward or reverse, for each of the five turret positions . . . the *exact* feeds and speeds for all types of tools, all kinds of metals. Then set the timing dogs and you are programmed for fully automatic machining—faster, more accurate production with fewer rejects.

Apply the many cost-cutting features of the new Model AB to your jobs. Get full information—write for the new 1 3/8" and 1 5/8" Model AB Cleveland Bulletin, or, better still, get in touch with a Cleveland sales engineer.



ONLY the 1 3/8" and 1 5/8" Model AB CLEVELAND DIALMATICS provide—

**EXACT SPINDLE SPEEDS**—infinitely variable between 40 and 3200 rpm. Automatic changes and reversals.

**EXACT TURRET FEEDS**—actually tuned to each cut. No cam changes with Cleveland's universal camming.

**OTHER PRODUCTIVITY FEATURES**—independently controlled front and rear cross slides . . . independent cutoff slide . . . easy handcrank adjustment of stock feed . . . quick-change collets and feedshells . . . only 6.3 second idle motion time . . . Geneva turret indexing mechanism . . . and a host of other design features which assure long-lived accuracy—low maintenance costs.

## THE CLEVELAND AUTOMATIC MACHINE COMPANY

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

For more information fill in page number on Inquiry Card, on page 221

### STAINLESS ?



TIP 3/8" diameter, #416 stainless steel. 107 pieces per hour gross on 1 3/8" Model AB. 6 operations include taper turn, end form, thread-roll.

### TOUGH ALLOY ?



PILOT 1 1/8" diameter x 4 1/2" long, SAE 8620 steel. 15 pieces per hour gross on 1 3/8" Model AB. 7 operations include box mill, cross turn, thread.

### MILD STEEL ?



HOUSING 1 1/2" diameter, SAE 1020 steel. 15 pieces per hour gross on 1 3/8" Model AB. 6 operations include heavy drill, deep form, tap.

### BRASS

THREADED BUSHING 3/8" hex, free machining brass. 225 pieces per hour gross on 1 3/8" Model AB. 7 operations.

### or ALUMINUM ?

RETAINER 1 1/2" diameter, 24S-T4 aluminum. 65 pieces per hour on 1 3/8" Model AB. 7 operations.



Remember,  
**CLEVELANDS CUT COSTS!**

**4936 Beech Street  
Cincinnati 12, Ohio**

SALES OFFICES: CHICAGO  
CLEVELAND • DETROIT  
HARTFORD • S. ORANGE

Crane Packing Co., Morton Grove, Ill. This light is four times larger than its preceding model. It measures 11 by 14 inches, with a work stage 10 inches square. A heavy-duty, 9000-volt transformer provides an average of 40-foot candlepower at the diffusing glass. The light head may be tilted back and adjusted for height to obtain maximum light on the area being checked. On pieces too large for the work stage, the light head may be swung around to permit checking work on the bench. This compact self-contained portable unit is made of heavy gage sheet steel with baked metallic gray finish and has a leather carrying strap on the cover.

Circle Item 154 on postcard, page 221

### Toledo Control Console with Remote Digital Recorder

Console consisting of a control panel and a cabinet for housing control elements of a weighing system announced by Toledo Scale Co., Toledo, Ohio. This console also provides a location for the listing and adding unit that records weight data originating at a remotely located scale or scales. It also provides the controls for various weighing operations and can be equipped for specific requirements of individual systems. The console can be remotely located at distances



up to 1000 feet. An entire weighing operation can be observed from the console.

Circle Item 155 on postcard, page 221

### Starrett "Safe-Flex" High-Speed Steel Band Saw

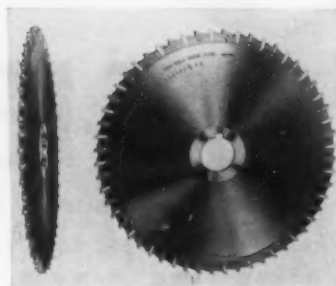
"Safe-Flex" high-speed steel band saw brought out by the L. S. Starrett Co., Athol, Mass. Important developments include: the



recent perfection of methods of producing high-speed steel in thin strip suitable for band saw stock; heat-treating methods which permit controlled hardness graduating from a super-hard cutting edge to a super-tough flexible back; and advancements in welding techniques which make possible welding high-speed steel saw stock into bands with the weld as strong as the parent metal. Tests are said to indicate that this saw will cut at exceptionally fast rates and have a much longer cutting life than regular blades when used on machines designed for high-speed steel band saws.

The band saw can retain hardness even up to red-heat temperatures of 1100 degrees F. Combined with the higher tensile strength and toughness, this permits greater tensioning, heavier feeds, and faster speeds for cutting hard and tough materials. Thicknesses of these bands range from 0.025 to 0.042 inch. They are available in regular, hook-tooth and skip-tooth types in four widths and a wide variety of pitches and are recommended for cutting tool and die steels, all ferrous alloys including carbon steels, free-machining steels, alloy steels, tool steels, stainless steel, as well as titanium and other hard-to-cut metals.

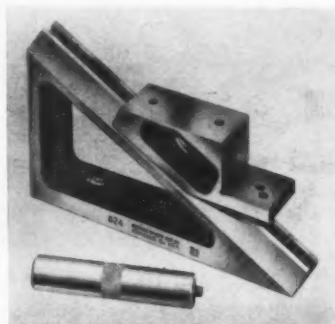
Circle Item 156 on postcard, page 221



### Apex Thin Cutter for Sawing and Slotting

New style, thin, alternate-angle, free-cutting milling cutters for sawing and cutting narrow, accurate slots manufactured by the Apex Tool & Cutter Co., Shelton, Conn. These cutters are made with tapered, serrated, self-locking blades, forged of selected high-speed steels scaled down for taking narrow cuts. The reinforced bodies are forged of tough, nickel-alloy steel. Ground blade faces and ample chip room give exceptionally free-cutting action. Replaceable blades are available in any diameter from 3 to 24 inches and in widths from 3/16 to 3/4 inch.

Circle Item 157 on postcard, page 221



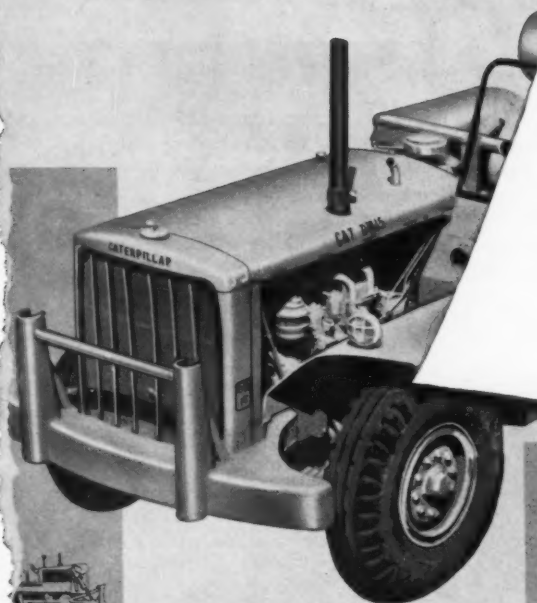
### B & S Tool-Setting Gage

Gage with range of 1/4 inch to 10 inches for precisely setting cutting tools on planers, milling machines, shapers, etc., announced by Brown & Sharpe Mfg. Co., Providence, R. I. This No. 624 planer and shaper gage, in addition to its exceptional stability, has beveled ways which eliminate side play and provide accurate alignment and parallelism between the working surfaces. It



FOUND WHERE WORLD FAMO

# GRAND RAPIDS GRINDER



PRODUCTION DEPARTMENT  
MEMO TO:

*Pete*

*This sounds to me  
like the grinder  
we want!*

*George*



- Wheel head moves to work—not work to head—for extra rigidity and convenience
- Fully guarded, anti-friction ball bearing ways
- Extra long table for greater work capacity
- Universal positioning of elevating hand wheel
- Four speed spindle drive
- Convenient one-shot lubrication system



Grand Rapids Universal Tool and Cutter Grinder, No. 62

*These features sound  
particularly outstanding*



**GALLMEYER & LIVINGSTON CO.**  
Grand Rapids, Michigan

Write for details

**GALLMEYER & LIVINGSTON CO.,** 305 Straight Ave., S.W., Grand Rapids, Michigan

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—245

has an extension that is usable on three surfaces, and the platform has an extra tapped hole to accommodate a post for indicators and other accessories. The base and slide are steel forgings. These forgings and the extension are hardened and ground.

Circle Item 158 on postcard, page 221



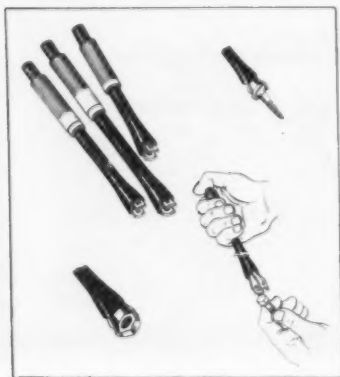
### End-Mills for Aluminum and Other Non-Ferrous Metals

End-mills specifically designed for aluminum and other non-ferrous materials are now available in standard sizes from Whitman & Barnes, Plymouth, Mich. Called the "Fastlead" series, these tools are additions to the W&B line of high-speed end-mills and include regular and long mills in sizes from 1/4 inch to 2 inches in diameter. Extra long mills are standard in sizes from 1/4 inch to 1 1/2 inches in diameter. A new flute design and a high helix angle are said to insure positive chip removal while a new type relief affords stronger cutting edges.

Circle Item 159 on postcard, page 221

### Tip Wrench for Bolts, Nuts, and Screws

Tip wrench designed to tighten or loosen nuts, bolts, and slotted machine screws in hard-to-reach places brought out by the Tipco Mfg. Co., Van Nuys, Calif. By ap-

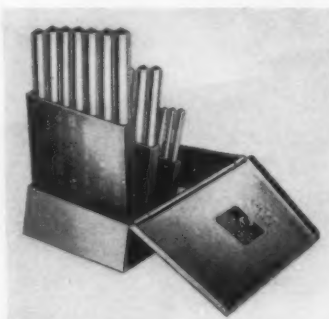


plying thumb pressure on the plunger head, the jaws open and slide out to the size required to grip the bolt, nut, or screw. Capacity ranges from No. 2 to No. 12 nuts and bolts. The tool is completely shockproof.

Circle Item 160 on postcard, page 221

### High-Speed Steel Drill Blanks

Drill blanks made in lengths corresponding to jobbers', wire, and letter-size drills and finished to the same tolerances placed on the market by Chicago-Latrobe, Chicago, Ill. These high-speed steel

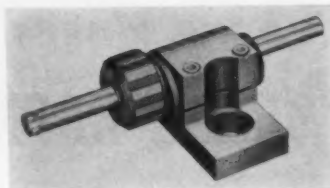


drill blanks can be used for punches, gages, and stock for making special tools. The range is complete in fractional, letter, and wire-gage sizes.

Circle Item 161 on postcard, page 221

### Boring-Bar Holder

Boring-bar holder for production work brought out by the Universal Engineering Co., Frankenth, Mich. This new lathe boring-bar holder is designed for quick mounting on the compound tool post of a lathe so that the power feed of the lathe carriage can be employed. Being mounted on an eccentric, the boring-bar holder can be easily adjusted by simply repositioning the eccentric to obtain the best cutting results from the tool. This eccentric feature also permits the holder to be used on lathes with varying center heights. The holder accommodates round boring-bars from 3/8 inch to 1 inch in diameter, using the universal collet which gives a 100 per cent wrap-around holding



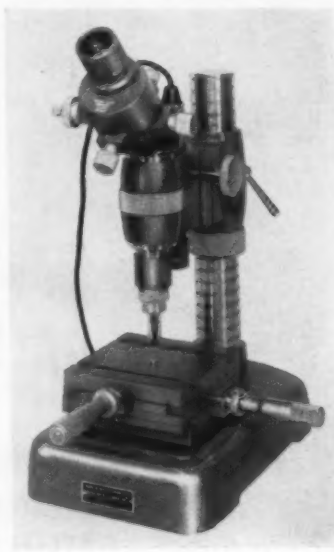
action. The bar can be adjusted for various depths. Square hole collets can also be supplied which accommodate square tool bits for counterboring and radius turning.

Circle Item 162 on postcard, page 221

### Ultra-Precision Measuring Microscope

Leitz microscope of ultra-precision measurement accuracy designed for the electronics and instrument fields by Opto-Metric Tools, Inc., New York City. This instrument will perform measurements on miniature parts to an exceptionally high degree of accuracy. It uses a 200X magnification with an optical micrometer reading in 0.00005 inch in which 0.00001 inch can be safely and easily estimated. A 400X magnification is optionally available with direct reading in 0.000025 inch. Measurements may be taken in x or y axis by rotating the ocular member 90 degrees against a stop. Built-in vertical illumination is standard equipment, but under-stage illumination is available.

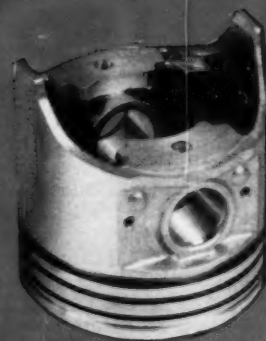
Circle Item 163 on postcard, page 221



**XLO****EX-CELL-O  
FOR  
PRECISION**

Overall view of automated elliptical turning machine that is part of complete piston processing line in auto plant.

# Roughs and Finishes 250 Pistons per Hour



This automated Ex-Cell-O machine semifinish and finish turns an elliptical shape on automotive piston skirts at the net rate of 250 pieces per hour.

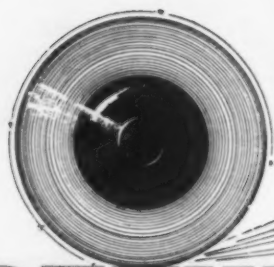
Pistons enter the machine from a conveyor, are radially located from their wrist pin holes and clamped on the ring land diameters. Four heads machine four piston skirts simultaneously. Air gaging follows the machining operation, after which pistons are ejected to another conveyor.

Write to Ex-Cell-O or contact your local representative for further information or a proposal.

**EX-CELL-O**  
CORPORATION  
DETROIT 32, MICHIGAN

*Machinery  
Division*

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



By E. S. Salichs

# BETWEEN GRINDS

## Engineer-Chaser

"I Am a Kidnap of Sorts," an article in *The Saturday Evening Post* (September 14, page 42, but we would spell it kidnapper), reveals how a top engineering recruiter, one of an estimated 5000, combs the country for engineers. He concedes that the recruiter's ground rules are "rough and dirty," and tells how he, in particular, works. A cartoon illustrating the article shows two thugs carrying a bound man into an office and saying to an executive seated behind his desk, "We located another engineering graduate, J.B.!"

## Guess When, Tungsten

One of the fascinations of tungsten mining, as told in *Tungsten*, a short book having the sub-title "The Story of an Indispensable Metal," is that one can never tell the extent of the deposits. In the early days (1917) at Mill City, Nev., an expert predicted that the ore would be exhausted at the most at a depth of 50 feet. Shafts are now down more than 1800 feet, and ore is still being mined, with no signs of diminishing.

## Sweep, Baby, Sweep

A birth announcement arrived in the mail recently, deviating somewhat from the usual information, besides enclosing a cigar, gift of the father, the Wilshire Engineering Dept. For the new arrival's weight was 1400 pounds (with a wet filter); and its baptismal name, Wilshire 2400 Electrisweeper.

## G-E Factory Resembles Beehive

Resembles? It was one recently, as a queen bee moved her colony of 20,000 workers, more or less, into a

50-hp General Electric motor about to be shipped out of the Schenectady plant. The motor was taken apart cautiously, the queen bee deposited, and the bees re-routed. Not one person was stung during the three-hour operation. Just how many hung around to see it, though?

## Profit by Error

A Pratt & Whitney employe, whose hobby is coin-collecting, reports in the company's house organ, *The News*, that he will pay \$1 for the 1955 U. S. penny, if the date is on it in two places, the result of an error made by the United States mint. With \$10 in pennies in our poker kitty, let's see—1954, 1956, 1953—we pass.

## Model Makes Museum

A Gisholt turret lathe, vintage 1889—and one of the very first manufactured by the Gisholt Machine Co.—has been donated to the new Hall of Tools at the United States National Museum Division of the Smithsonian Institution in Washington, D. C., taking its place with other old-time models being contributed by the machine tool industry to help show industrial development.

## Hi, Hilac

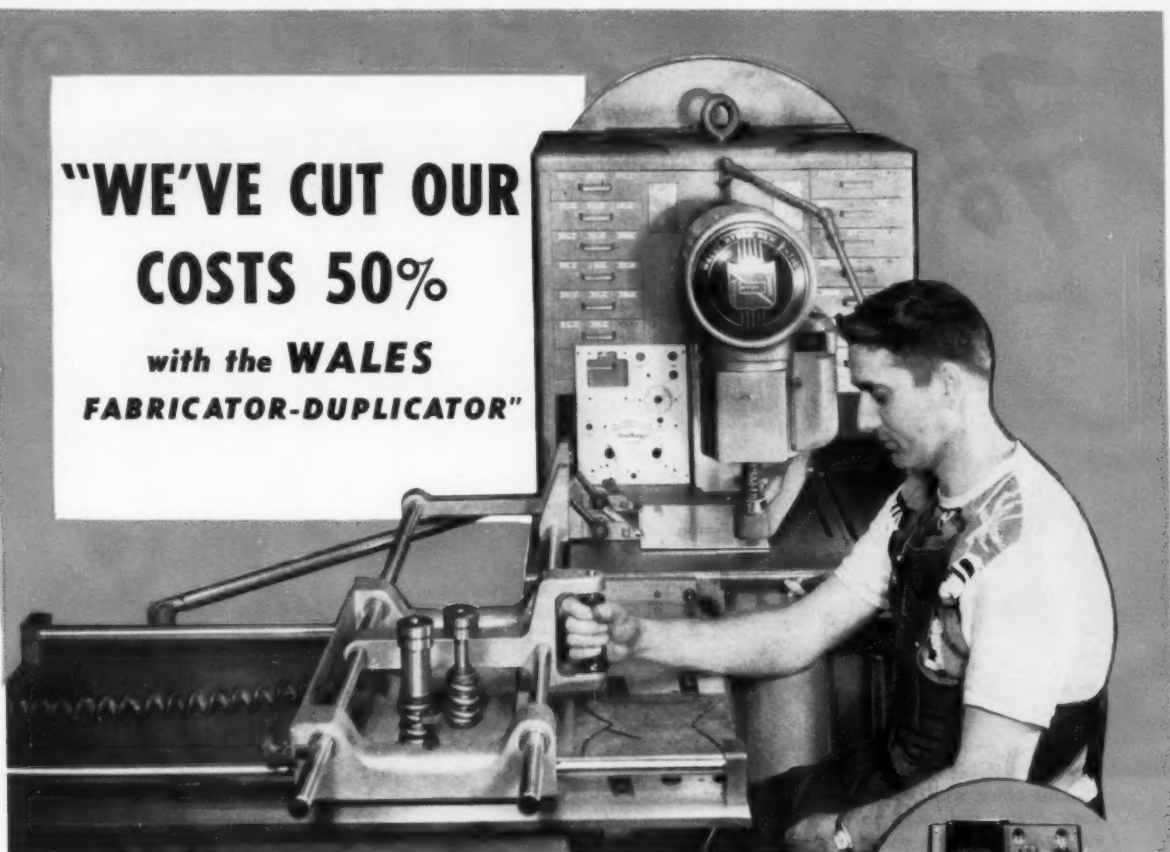
Puzzled about the names given the huge machines built for atomic or electronic use? The HILAC, for instance, is a new type atom-smasher, the name standing for "heavy ion linear accelerator."



SHOPPING FOR YOUR WINTER SUIT?—This one combines several suits in one, economical what, giving protection against submersion, heat, cold, and pressure. It was designed for supersonic United States Air Force pilots, and is being smilingly modeled by W. H. Reineking, design specialist (and guinea pig) in charge of the Human Engineering Group at Convair Division of General Dynamics Corporation, which is working with the Industry Crew Escape Systems Committee, or as you would assume, the ICESC. Note the helmet—a ball-bearing sealing ring connects helmet and suit, permitting the head to turn 90 degrees in either direction. The boots float, too



**"WE'VE CUT OUR  
COSTS 50%  
with the WALES  
FABRICATOR-DUPPLICATOR"**



Mr. Richard H. Aufderheide, President and Production Manager of Rex Metal-Craft Inc., Indianapolis, Indiana reports: "We have been able to cut our costs 50% by using the Wales Fabricator and Duplicator for the manufacture of the Breathalyzer. This punching equipment has proven highly efficient for fast set-up, close tolerance, short to medium production work."

The WALES Fabricator combined with WALES positive Duplicator is the modern, low cost answer to hole punching. You get holes with sharp definition, clean walls and minimum bell mouth. This equipment is perfect for short to medium runs, from one piece to thousands. Change dies for hole sizes in seconds with a range up to 3½" dia. Accuracy is automatic and positive. Make your own templates, too, on the Fabricator. Eliminate layout, drilling machines or jig-borers. The WALES Fabricator-Duplicator is a complete punching shop in itself.

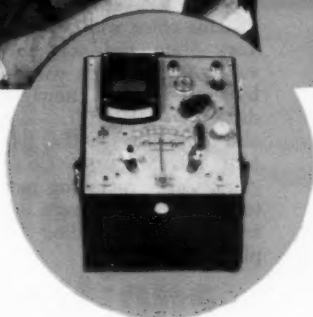
**WALES *Strippit* COMPANY**

A UNIT OF HOUBAILLE INDUSTRIES, INC.

**AKRON, NEW YORK**

WALES-STRIPPIT OF CALIF., SOUTH GATE, CALIF.  
WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONT.

**"...the Wales-Way is the PLUS-PROFIT way"**



The Breathalyzer is an instrument for determining immediately the degree of alcoholic intoxication. This instrument is used widely by law enforcement agencies and Laboratories.

**SEND FOR BULLETIN No. 16K**

Time studies, specifications, illustrations etc., are all yours for the asking.



**WALES MOBILE FIELD UNITS**

We'll bring the Fabricator Duplicator right to your door for a demonstration.

Ask for details.



# News

## OF THE INDUSTRY

### Illinois

JOSEPH T. RYERSON & SON, INC., warehousing subsidiary of Inland Steel Co., Chicago, Ill., has announced the opening of a steel service plant at Mount Holly and Chemway Roads, Charlotte, N. C.

A. V. MOROZ has been appointed electric tools sales manager for the Chicago branch of Thor Power Tool Co., Chicago, Ill., succeeding ARTHUR H. NELSON, who retired after twenty-three years with the firm.

### Michigan and Wisconsin

WAGNER BROTHERS, INC., Detroit, Mich., has established a new branch at 109 Baker St., East Syracuse, N. Y. This office will cover all of New York State and northern Pennsylvania. Its operation will be directed by TOM KOHLER, newly appointed district manager. The company has also purchased the AUTOMATIC MOLDING MACHINE CO., Los Angeles, Calif., including patent rights to the firm's automatic compression and injection molding presses for plastics.

COLONIAL BROACH & MACHINE Co., Detroit, Mich., announces the following appointments: ARVID O. LUNDELL, president of the firm, has



Arvid O. Lundell, president of Colonial Broach & Machine Co.

accepted the position of assistant to the Director of the Metalworking Equipment Division of the Business and Defense Services Administration, U. S. Department of Commerce. JAMES R. UBER has become district manager in the Pittsburgh, Pa., area.

COLONIAL-ROMULUS DIVISION, Colonial Broach & Machine Co., Detroit, Mich., has announced nine more representatives: H. L. MONAHAN Co., St. Louis, Mo.; NATIONAL SALES ENGINEERING CORPORATION, Detroit, Mich.; PERINE MACHINERY & SUPPLY Co., INC., Seattle, Wash.; SCOTT MACHINE TOOL Co., Atlanta, Ga.; SEABOARD MACHINERY Co., Los Angeles, Calif.; F. W. STRASSMAN Co., San Mateo, Calif.; A. S. GUILLE, Dayton, Ohio; Interstate Equipment & Engineering Co., Chicago, Ill.; and T. S. MELLE, South Bend, Ind.

RACINE HYDRAULICS & MACHINERY, INC., Racine, Wis., which recently acquired SIMPLEX ENGINEERING Co., Zanesville, Ohio, as a subsidiary, announces five appointments of distributors to represent the SECO lines of hydraulic equipment made by the subsidiary. DESHAZO & THOMAS, Birmingham, Ala.; LANDES, ZACHERY & PETERSON, Denver, Colo.; J. E. DILWORTH Co., Memphis, Tenn.; HYDRAULIC & AIR EQUIPMENT Co., Portland, Ore.; TRIDEL EQUIPMENT LTD., Vancouver, B.C.; and GARRETT BURGESS, INC., Detroit.

VICKERS INCORPORATED, Detroit, Mich., has named WALLACE W. WILLIAMS to the post of application engineer in the Rockford, Ill., office, while CALVIN A. BOCK has been given the same position in the Cleveland, Ohio, branch. The Chicago office of the company has been increased by the addition of ROBERT F. RICHARDS, industrial products application engineer.

SUPER TOOL DIVISION, Van Norman Industries, Detroit, Mich., has announced two promotions: MILTON J. STEFFES has advanced from vice-president of sales and engineering to vice-president and works manager. LAWRENCE A. McDONALD has been appointed sales manager.



Chester S. Johns, sales manager, Buhr Machine Tool Co.

BUHR MACHINE TOOL Co., Ann Arbor, Mich., announces appointment of CHESTER S. JOHNS as sales manager and VERNON H. SAMSON, as controller.

DAKE CORPORATION, of Grand Haven, Mich., has announced the completion of its new plant at 724 Robbins Road, Grand Haven Township. There are 45,000 square feet of shop space and 5600 feet of office space.

TIMKEN ROLLER BEARING Co., Canton, Ohio, announces the move of its Detroit sales offices and warehouse to 16101 Schaefer Highway at Puritan Ave., Detroit, Mich.

DETROIT BEVEL GEAR Co., Detroit, Mich., subsidiary of Gear Grinding Machine Co., has been bought by NAPCO INDUSTRIES, Minneapolis, Minn.

RICHARD E. KRENGEL has been named general manager of the Ex-Cell-O Corporation of Canada, Ltd., London, Ont., Canada.

CLEEREMAN MACHINE TOOL CORPORATION, Green Bay, Wis., subsidiary of Bryant Machinery & Engineering Co., has appointed W. H. JORGENSEN general manager and W. GERALD TYSON, chief engineer

**XLO**  
EX-CELL-O FOR PRECISION



Ex-Cell-O Style 312 Cam Boring Machine adapted for automation. Components on cross slide automatically adjust tools to hold specified limits.

Typical gear blanks after automatic machining is completed.

Complete automation unit for machining steel gear blanks. Note dial groupings at gaging stations visible in this picture.

## Standard Ex-Cell-O Machines Handle Automatic Operations

Take these cam boring machines, for example: they are standard Ex-Cell-O 312s. When a customer's production schedule called for an unusually high per hour output of steel gear blanks Ex-Cell-O engineers incorporated these machines into an automated setup.

Included in the new setup: two cam-operated Ex-Cell-O Precision Boring Machines, two Gear-O-Mation storage-distribution units, three gaging stations.

The boring machines finish all the surfaces of the gear blanks: face both sides, chamfer both inner and outer edges, bore the central holes and turn the outside diameters. Tools are adjusted automatically to maintain required tolerances. Gage units automatically check parts prior to entering the machining stations, and the storage-distribution units provide space for a bank of parts at each machine station.

If you're interested in automation, but are held back by the high cost of specially designed machine tools, call your nearby Ex-Cell-O Representative today. Perhaps a standard Ex-Cell-O machine tool setup can be adapted to your automatic operation requirements. Or, if you prefer, contact Ex-Cell-O in Detroit directly.

**EX-CELL-O**  
CORPORATION  
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

for all engineering design, development, and research.

FAMCO MACHINE CO., Kenosha, Wis., announces four executive placements: JOHN E. GLEBS has been appointed vice-president and controller. LOWELL JENSEN has been promoted to works manager; BERNARD MATTER has been made chief engineer, and RONALD ASHENFELTER has become chief purchasing agent.

J. L. BLACK has been appointed supervisor, industrial press section, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

### New England

PRATT & WHITNEY CO., INC., West Hartford, Conn., has opened a branch sales office in Charlotte, N.C. This branch, located at 1220 E. Fourth St., will be the company's headquarters for machine tool, cutting tool, and gage sales. JAMES F. ROYSTER will serve as manager of the new branch and RALPH I. FRIEND will supervise office details and stocking programs. Also the company has marked the opening of its Hartford district sales office at 505 Oakwood Ave., West Hartford, Conn. A branch has been opened in Milwaukee, Wis., at 9217 W. Center St. Sales at the Hartford office are under the direction of PAUL C. RENNO and HERBERT H. WILBRAHAM, and heading the Milwaukee branch office are FREDERICK D. WATSON and ARTHUR J. LADUCER.

NORTON CO., Worcester, Mass., has announced the appointment of HENRY C. MOGENSEN, JR., as district sales engineer for the Grinding Machine Division in the Detroit area. The company also has announced changes in the organization of the Electro-Chemical and the Refractories Divisions, Worcester, Mass. In the Electro-Chemical Division, HARLAN T. PIERPONT has been appointed manager of sales and has also become a member of the operating board, and FREDERICK J. RUTLAND has been named manager of sales engineering. In the Refractories Division, FRANK B. HUKÉ has been appointed manager of atomic product sales, and GEORGE H. POWERS has been promoted to manager of distribution.

TAFT-PEIRCE MFG. CO., Woonsocket, R. I., has announced the following assignments: WENDELL F. CARNEY has been appointed general sales manager of the company, while RICHARD R. READ and HERBERT A.

POTTER have been named Detroit branch manager and Rochester sales manager, respectively.

BLACK & DECKER MFG. CO., Towson, Md., announces the opening of a new factory service and sales branch in Hartford, Conn., at 33 Webster St.

### New York and New Jersey

GENERAL ELECTRIC Co., New York City, has announced a series of promotions and alignments in executive office positions: ROBERT PAXTON has been elected to the board of directors and has been appointed executive vice-president—operations. ARTHUR F. VINSON has been named vice-president and group executive, apparatus group, to succeed Mr. Paxton. HALBERT B. MILLER has been elected vice-president of the company and vice-president of manufacturing services. JAMES H. GOSS has been elected a vice-president of the company and has received the assignment of vice-president and group executive of the consumer products group. ROY W. JOHNSON will serve as vice-president and con-

sultant to Mr. Goss. ROBERT T. SCHULENBERG has been made supervisor, machine tool development, Large Steam Turbine Generator Department. BERT CROSS, carbide tool application engineer, has been named by General Electric Co.'s Metallurgical Products Department, Detroit, Mich., service engineer in the Atlantic district for Carboloy cemented carbides. Headquarters of the Atlantic district are Kennilworth, N. J.

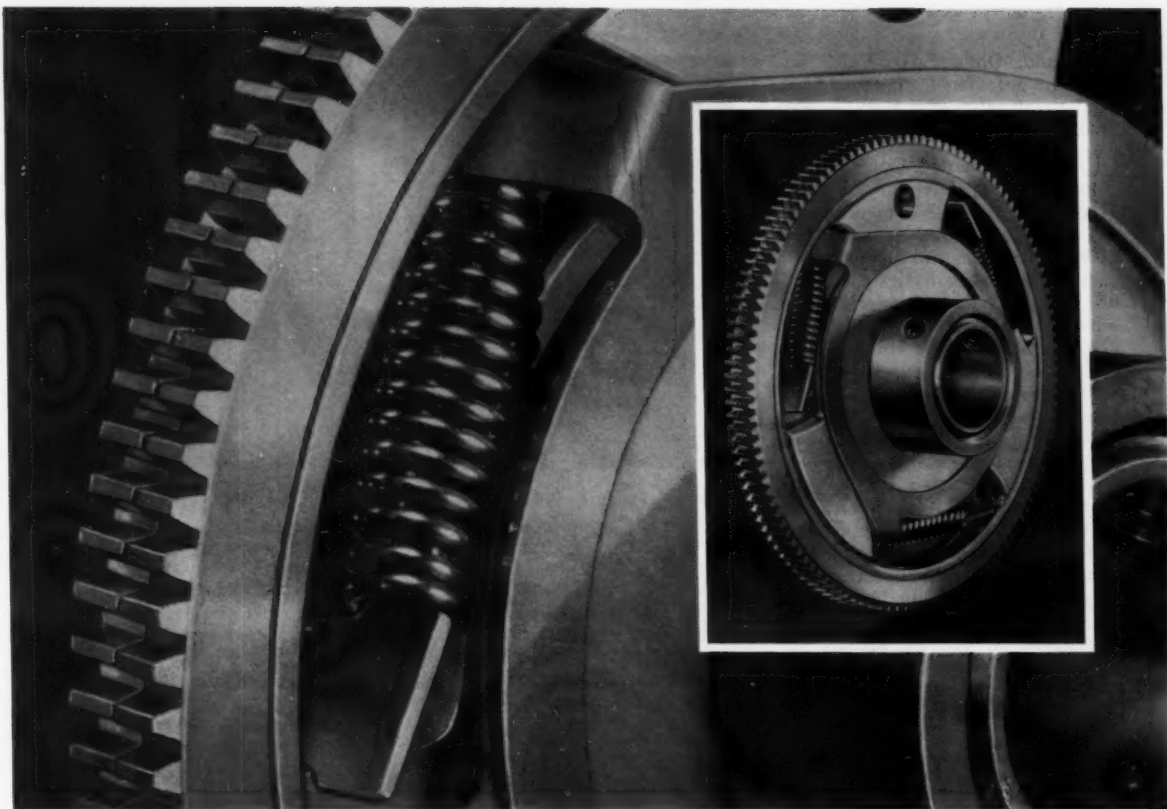
MALCOLM R. HARRIS has been named sales engineer for the Electronics & Instrument Division, Baldwin-Lima-Hamilton Corporation, in its eastern district sales office in New York City. Prior to this appointment Mr. Harris was assistant manager of market research at the Division's headquarters at Waltham, Mass.

PARKER-KALON DIVISION of General American Transportation Corporation, Clifton, N. J., has acquired the exclusive American manufacturing and sales rights to patented Pneuma-Serve fastener feeding equipment through a license granted by Geo. A. Tinnerman Corporation,



Louis Goldberg (center) who heads Parker-Kalon Division of General American Transportation Corporation, and Spencer D. Moseley (left), a director of General American Transportation, are shown with George A. Tinnerman, president of Geo. A. Tinnerman Corporation from whom P-K has acquired American Manufacturing sales rights to P-K fastener feeding equipment.





**G.S. gives you NON-SPREAD CONTROL  
for preloaded Gears with this  
patented "SPRING-GRIP" construction...**



**GEAR**

**Specialties, Inc.**

2635 WEST MEDILL AVENUE  
CHICAGO 47, ILLINOIS

SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS  
WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS  
OF FRACTIONAL HORSEPOWER GEARING

The cross-springing feature of this patented G.S. "Spring-Grip" construction holds the twin Gears of this anti-backlash unit under positive control—without spreading or parting—under thrust load from the mating Spur or Worm. Without such control, the scissors action which "pinches" the teeth of the mating part may be interfered with, through improper location of tooth contact with the mating part. The illustration shows how this "Spring-Grip" feature is applied to a Worm Gear; one of the twin elements is fixed to the hub, the other is free to rotate within limits controlled by the springs. G.S. "Spring-Grip" construction is also available in straight or helical Spur Gears.

We can also supply other styles of preloaded Gears with compression-type coil springs, torsion or loop springs, to fit varying needs. All are made with the famous G.S. precision and rigid quality control, assuring the accurate tooth profiles so essential in the intimate contact occurring with anti-backlash Gearing.

G.S. specialized experience, broad line, and unsurpassed engineering and manufacturing resources—the most extensive in its field—can help solve your Fractional Horsepower Gear problems too. Call us in to discuss them!

**SEND FOR** G.S. technical data, free! See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. Folder contains 23 pictures of Small Gears, plant view, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!

*41 Years of Specializing in Small Gearing!*

Cleveland, Ohio. Parker-Kalon will market automated Pneuma-Serve equipment nationally, together with its line of P-K screws.

UNION CARBIDE CORPORATION, New York City, has announced the establishment of 268, four-year engineering scholarships at forty-eight colleges, technological institutes, and universities. This brings the total of Union Carbide undergraduate scholarships to 660 at ninety-five liberal arts and engineering colleges and universities. The new scholarships provide full tuition for four years of undergraduate studies and allowances for necessary fees, as well as an annual grant to the college. They will be awarded by the individual colleges. No commitment as to future employment by either the students or corporation is made. The company also has announced a new graphite electrode plant being built at Apodaco, Mex., by Electrodo's Nacionales, S. A., an affiliate of Union Carbide. The new factory, scheduled to start production in 1958, will serve the electric furnace steel, ferro-alloy, and electrochemical industries, as well as provide nuclear materials for Mexico.

LINDE Co., Division of Union Carbide Corporation, New York City, has announced plans for extensive new facilities for the company's Tonawanda Research Laboratories. A high-pressure laboratory, metallurgical laboratory, a new hydrocarbon storage building, and a new services building are to be constructed. The company also announces two appointments: DR. L. I. DANA has been named vice-president of research and development. DAVID SWAN has been appointed director of research.



(Right) Harry C. Kemper, chief engineer, and Harold J. Siekmann, retired vice-president, R. K. LeBlond Machine Tool Co.

NIAGARA MACHINE & TOOL WORKS, Buffalo, N. Y., has announced the appointment of SMITH-COURTNEY Co., 7th and Bainbridge Sts., Richmond, Va., as distributor in Virginia and North Carolina.

HARRY C. KEMPER has been appointed chief engineer of the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. Mr. Kemper has been with the company since 1923 and has played a leading part in designing the company's crankshaft and engine lathes. He replaces HAROLD J. SIEKMANN, vice-president and chief engineer, who is retiring. Mr. Siekmann came to LeBlond in 1910. He was appointed vice-president and chief engineer in 1944 and has been a member of the board of directors since 1954.

#### Ohio

E. W. BLISS Co., Canton, Ohio, has announced three changes in executive assignments: In the Canton Division, JOHN LINDBERG has been appointed manager and RICHARD Y. MOSS, special product sales manager. In the Mackintosh-Hemphill Division, Pittsburgh, Pa., CHARLES E. PETERSON has been promoted to the position of manager of manufacturing operations. Also the company's can machinery manufacturing operations in Hastings, Mich., have been moved to 1004 E. State St.

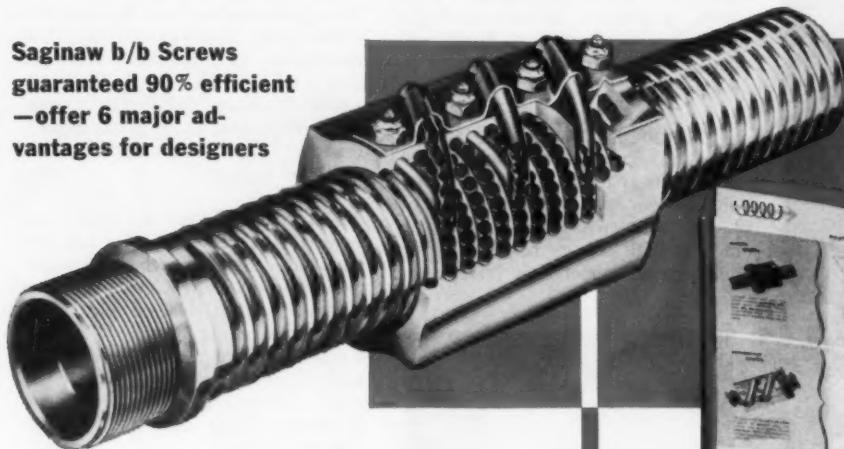
CINCINNATI SHAPER Co., Cincinnati, Ohio, has announced the organization of the Cincinnati Shaper Co. Ltd., a subsidiary for the manufacture of metalworking machinery in Britain. DAVID H. MARCH, vice-president of the parent company, is managing director of the British subsidiary.



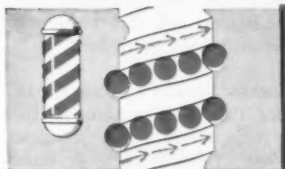
(Left) John Lindberg, manager, Canton Division; (center) Richard Y. Moss, special product sales manager, Canton Division; and Charles E. Peterson, manager of manufacturing operations, Mackintosh-Hemphill Division; E. W. Bliss Co.

# ACTUATION PROBLEM too tough for ordinary devices? SAGINAW CAN HELP YOU SOLVE IT!

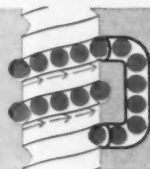
Saginaw b/b Screws  
guaranteed 90% efficient  
—offer 6 major ad-  
vantages for designers



Available in custom machined and commercial rolled thread types—have been built from 1½ inches to 39½ feet long—¾ to 10 inches diameter.



Nut glides on steel balls. Like stripes on a barber pole, the balls travel toward end of nut through spiral "tunnel" formed by concave threads in both screw and mating nut.



At end of trip, one or more tubular guides lead balls diagonally back across outside of nut to starting point, forming closed circuit through which balls recirculate.

**1 VITAL POWER SAVINGS.** With guaranteed efficiency of 90%, Saginaw b/b Screws are up to 5 times as efficient as Acme screws, require only ⅓ as much torque. This permits much smaller motors with far less drain on the electrical system. Circuitry is greatly simplified.

**2 SPACE/WEIGHT REDUCTION.** Saginaw b/b Screws permit use of smaller motors and gear boxes; eliminate pumps, accumulators and piping required by hydraulics. In addition, Saginaw b/b Screws themselves are smaller and lighter. Units have been engineered from 1½ in. to 39½ ft. in length.

**3 PRECISE POSITIONING.** Machine-ground Saginaw b/b Screws offer a great advantage over hydraulics or pneumatics because a component can be positioned at a predetermined point with precision. Tolerances on position are held within .0006 in./ft. of travel.

**4 TEMPERATURE TOLERANCE.** Normal operating range is from -75° to +275° F., but assemblies have been designed in selected materials which function efficiently as high as +900° F. These units are practical where hydraulic fluids have lost efficiency or reached their flash point.

**5 LUBRICATION LATITUDE.** Even if lubrication fails or cannot originally be provided because of extreme temperatures or other problems, Saginaw b/b Screws will still operate with remarkable efficiency. Saginaw units have been designed, built and qualified for operation without any lubrication.

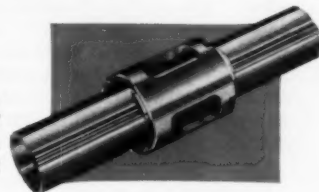
**6 FAIL-SAFE PERFORMANCE.** Far less vulnerable than hydraulics. In addition, Saginaw offers three significant advantages over other makes: (1) Gothic arch grooves eliminate dirt sensitivity, increase ball life; (2) yoke deflectors and (3) multiple circuits provide added assurance against operating failure.

## YOUR FREE COPY OF THIS NEW b/b SCREW AND SPLINE "PROBLEM SOLVER" SHOWS HOW

36 pages crammed with time-, work-, and money-saving facts: Principles • Types • Basic Operations • Coupling Methods • Efficiency • Advantages • Selection Factors • Design Data • Sample Problems

### SAGINAW b/b SPLINE

● Averages 40 times lower coefficient of friction than ordinary sliding splines!



Utilizing the same basic *gliding ball* principle, Saginaw has developed the *Saginaw b/b Spline* which radically increases the efficiency of transmitting or restraining high torque loads.

It can be fitted with integral gears, clutch dogs, bearing and sprocket seats, etc. Units have been built from 3 inches to 10 feet long—¾ to 6 inches in diameter.

### SEND TODAY FOR THIS FREE 1957 ENGINEERING DATA BOOK...

or see our section in Sweet's Product Design File



Saginaw Steering Gear Division  
General Motors Corporation  
b/b Screw and Spline Operation  
Dept. 7Y, Saginaw, Michigan

Please send new engineering data book on Saginaw b/b Screws and Splines to:

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_ TITLE \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

**Saginaw**  
ball bearing  
Screws and Splines

SAGINAW STEERING GEAR DIVISION OF GENERAL MOTORS  
WORLD'S LARGEST PRODUCER OF BALL BEARING SCREWS AND SPLINES

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—255



Frank J. Fields, works manager,  
Fosdick Machine Tool Co.

FRANK J. FIELDS has been appointed works manager of the Fosdick Machine Tool Co., Cincinnati, Ohio. Mr. Fields was formerly executive vice-president of the Sidney Machine Tool Co., Sidney, Ohio.

TED DU MOND has joined the Cleveland headquarters staff of the American Society for Metals. He will be editor in chief of the Society's Metals Engineering Institute educational courses. This new division of the Society established two years ago offers specialized correspondence courses and in-plant instruction for metals engineers and technicians on a total of forty different metallurgical subjects. Mr. Du Mond was formerly editor-in-chief of "Materials and Methods," New York City.

RELiance ELECTRIC & ENGINEERING Co., Cleveland, Ohio, has announced the establishment of a new branch office in the Kirstein Bldg., Central St., Bangor, Me. NORWOOD F. JOY has been named manager of this office which will render sales and engineering service to industries throughout the state. JOHN P. LANDIS has been appointed Appleton, Wis., branch manager; CLAYTON Y. GOSS, Dayton, Ohio, branch manager; and MERLE K. SIEBER, Charleston, W. Va., branch manager.

PARKER APPLIANCE Co., Cleveland, Ohio, which recently purchased Hannifin Corporation, Des Plaines, Ill., has voted to change the company name to Parker-Hannifin Corporation.

JOHN R. DAVIS, Chattanooga, Tenn., has been appointed southeastern representative for the Machine Division, Osborn Mfg. Co., Cleveland, Ohio.

SHEFFIELD CORPORATION, Dayton, Ohio, a subsidiary of Bendix Aviation Corporation, has acquired a major interest in M. P. J. GAUGE & TOOL Co. LTD., Birmingham, England, producers of special high-precision fixed gaging equipment and dial indicator instruments.

MINSTER MACHINE Co., Minster, Ohio, has named E. PALMER MEREDITH, who is president of the Meredith Machinery Co., Englewood, N. J., as exclusive representative in metropolitan New York and the northern section of New Jersey.



Robert R. Rhodehamel, vice-president  
and general sales manager, National  
Acme Co.

ROBERT R. RHODEHAMEL has been elected vice-president and general sales manager for the National Acme Co., Cleveland, Ohio. He joined the organization in 1914.

KENNETH H. MEYER has been appointed director of engineering at C. B. Hunt & Son, Inc., Salem, Ohio.

### Pennsylvania and Maryland

WILLIAM M. KERRIGAN has been named manager of Flexloc sales in the locknut department, Standard Pressed Steel Co., Jenkintown, Pa. His appointment fills the position left vacant by the promotion of JOHN J. WIEST to the newly created post of technical director of the locknut department. WALTER H. BROWN has been named to the post of Midwest sales coordinator. THOMAS A. BREEN succeeds him as Chicago district sales manager. The company also announces the acquisition of the NUTT-SHEL Co., Glendale, Calif.

LANDIS TOOL Co., Waynesboro, Pa., has opened a district sales office to serve southern Ohio and northern Kentucky at 15 N. Main St., Centerville, Ohio. Also announced has been the appointment of two distributors—GEORGE M. MERIWETHER, INC., Birmingham, Ala., to serve Alabama and northwest Florida; R. O. DEADERICK Co., Knoxville, Tenn., to cover Tennessee; and C. J. HARTER MACHINERY Co., Houston, Tex., for southern Texas.

ALLEGHENY LUDLUM STEEL CORPORATION, Pittsburgh, Pa., has announced the following appointments: JAMES L. MCGINNIS has been made St. Louis district sales manager, succeeding CARL W. MESSINGER, who has retired after a business career spanning thirty-eight years. DENTON HASSEL has become distributor sales manager for the Carmet Division.

JAMES J. BARRETT has been appointed manager of extrusion sales for the Babcock & Wilcox Co.'s Tubular Products Division, Beaver Falls, Pa. In the newly created position, Mr. Barrett will direct the sale of hollow and solid extrusions.

STRUCHERS WELLS CORPORATION, Titusville, Pa., has announced the sale of its interest in its tangent bender and related metal-forming and work-handling machinery to the TAYLOR-WINFIELD CORPORATION, Warren, Ohio.

MARQUIS P. ORR has been appointed manager of roll sales for E. W. Bliss Co.'s Mackintosh-Hemphill Division, Pittsburgh, Pa. Mr. Orr joined the Mackintosh-Hemphill Co.



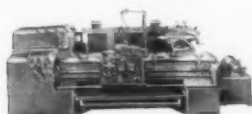
Marquis P. Orr, manager of roll sales,  
Mackintosh-Hemphill Division,  
E. W. Bliss Co.



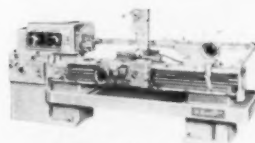
# V-R Toolholders and Carbide Inserts for Tracer Lathe Operations



Monarch



American



Lodge & Shipley



Gisholt



Seneca  
Falls



New Britain + GF +

There is a complete line of V-R toolholders for all profiling operations . . . *plus* styles, sizes and grades of cemented carbide inserts for every requirement. Standard V-R carbide grades give superior results on the majority of operations. Special grades are available for unusual applications.

Let your qualified V-R field service engineer help you select and apply the toolholders and inserts that will give you optimum results on any job.

**ASK FOR NEW TOOLHOLDER MANUAL**  
—52 pages of technical data on the selection and use of V-R toolholders—Yours for the asking, without obligation.



TH-643



MANUFACTURERS OF:  
CEMENTED CARBIDES, TOOLHOLDERS and TANTUNG® CAST ALLOY CUTTING TOOLS

## Vascoloy-Ramet Corporation

SUBSIDIARY OF FANSTEEL METALLURGICAL CORPORATION

890 Market Street • Waukegan, Illinois

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—257

in 1941 in an internal sales capacity and later became a roll engineer. Prior to his present appointment, he was assistant manager of roll sales.



Wilbur L. Kennicott, vice-president, Kennametal Inc.

WILBUR L. KENNICOTT has been elected a vice-president of Kennametal Inc., Latrobe, Pa. He has been associated with the company for eighteen years.

CRUCIBLE STEEL COMPANY OF AMERICA has announced the appointment of J. D. DICKERSON to the newly created position of manager—steel production, with offices at the company's headquarters in Pittsburgh, Pa. LESTER C. HILL has become assistant sales manager of the Sales Division at the same location.

JAMES R. MCCONNELL has been appointed to the newly created position of manager, abrasive sales,



James R. McConnell, manager, abrasive sales, Pangborn Corporation

Pangborn Corporation, Hagerstown, Md. In his new position, Mr. McConnell will coordinate the newest technical developments in blast-cleaning materials with improved customer and field service in the application of abrasives to obtain better cleaning results at lower cost. Mr. McConnell has had ten years of experience in the abrasives field.

BLACK & DECKER MFG. CO., Towson, Md., has announced three major manufacturing appointments: JOHN M. FOX, Hampstead plant manager; KARL B. SALANDA, director of industrial and plant engineering; and WILLIAM B. FORD, Jr., Towson plant manager. The company also has announced the opening of a new warehouse at 1417 Murray St., North Kansas City, Mo. This facility will serve Midwest distributors of the company's electric tool products.

• • •

### Undergraduate Engineering Awards

Engineering undergraduates in twenty-six engineering schools and universities received recognition and awards this year in the annual competition sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, for student designs of welded machines and structures. A total of forty-six awards amounted to \$5,000. Duplicate awards in scholarship funds were presented to schools honoring the students receiving the main awards. Similar competition is being sponsored for the current school year.

• • •

### Domestic Tungsten Mining Industry Seeks Government Action

A two-part program to save the domestic tungsten mining industry from extinction has been presented to members of the Subcommittee on Minerals, Materials and Fuels of the Senate Committee on Interior and Insular Affairs. The suggested program, if enacted, would halt the closing of tungsten mines in this country and would tend to revitalize the industry. Lack of government purchase support for the domestically mined mineral, combined with continued dumping of foreign mined tungsten that has devalued the world market, threatens a total loss of one of the nation's most strategic natural resources.

## Coming Events

NOVEMBER 4-8—Three national meetings have been announced by the Society of Automotive Engineers to be held in the Hotel Statler, Cleveland, Ohio. The SAE National Transportation meeting is scheduled for November 4 to 6; the SAE National Diesel Engine meeting, for November 5, and 6; and the SAE National Fuels and Lubricants meeting, for November 7 and 8. General chairman is Theodore R. Thoren of Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, Ohio.

NOVEMBER 4-6—Ninth Annual American Institute of Electrical Engineers' Machine Tool Conference will be held in the Hotel Schroeder, Milwaukee, Wis. Harry Ankeney of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., is the general chairman. The conclave is sponsored by the Machine Tool Subcommittee of the AIEE.

DECEMBER 1-6—Annual Meeting of American Society of Mechanical Engineers has been announced. Concurrent with the ASME sessions will be the annual meeting of the American Rocket Society, an affiliate of ASME. Meetings will be held at the Statler and McAlpin hotels. Further information may be obtained from the ASME Meetings Department, 29 W. 39th St., New York 18, N. Y.

JANUARY 27-30, 1958—Plant Maintenance and Engineering show, which returns to Chicago for the first time in three years, will be held in the International Amphitheatre. The Annual Plant Maintenance and Engineering Conference is also set there for the same week. For further information contact Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

• • •

A demonstration of the advantages of free-machining aluminum screw stock was held recently at the National Acme Co., Cleveland, Ohio. It was sponsored jointly with the Aluminum Co. of America. Included in the program was a demonstration of typical applications of aluminum screw machine parts, actual screw machining of aluminum and other metals, and the premiere showing of "The Four Amazing Alloys," Alcoa's new color motion picture for the screw machine industry.



**You learn a lot in a hundred years... especially in the hundred just passed**

—the greatest century of technical progress the world has ever seen. Born as it was, on the brink of the era, the growing Bliss Company was in a position to make a number of contributions to pressed metal-working... the first inclinable press, for example, and the famous rolling key clutch, the toggle press principle, pneumatic clutches, these are some of the more important ones.

Proud? Of course we are—of these contributions and of the men who made them possible. For we've learned in our past century that: Any company, no matter what its size, is basically people... that a customer isn't a purchase order, but someone to whom we are responsible both now and in the future. This is part of what we mean when we say, "Bliss is more than a name... it's a guarantee."

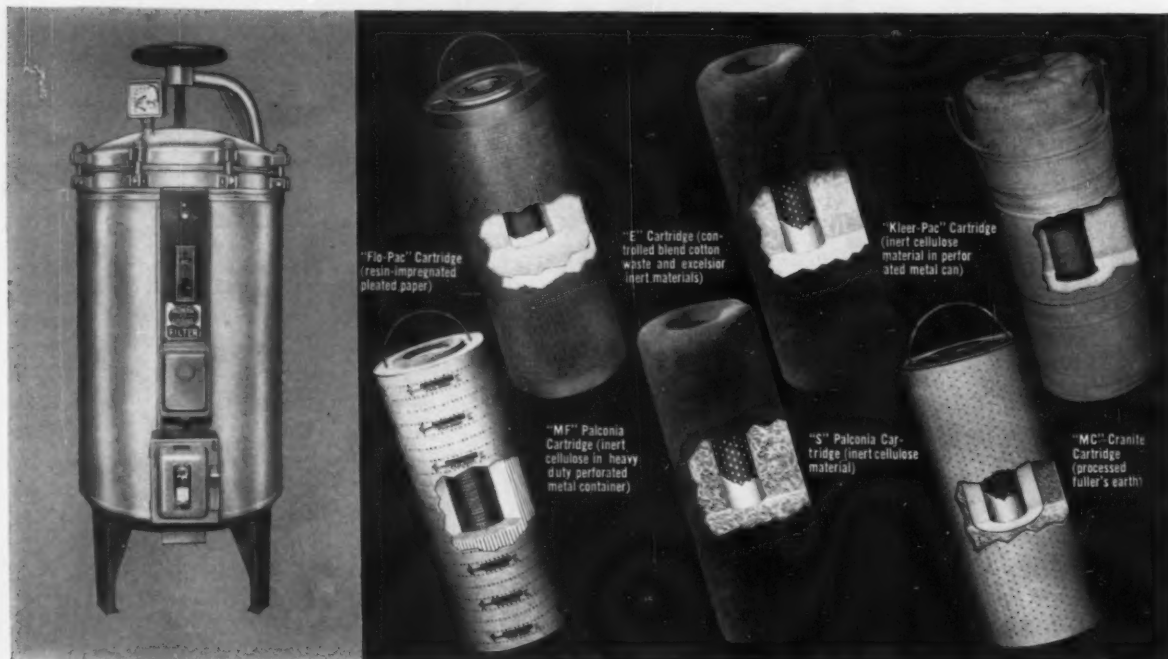
**BLISS**  
SINCE 1857

**E. W. BLISS COMPANY • Canton, Ohio**

*100 years of making metal work for mankind*

PRESSES • ROLLING MILLS • ROLLS • DIE SETS • CAN MACHINERY • CONTRACT MFG.

# 6 Types of interchangeable cartridges give you selective filtration



## Reduce Wear—Improve Finish—Protect Equipment—Lower Cost WITH MULTI-CARTRIDGE FILTERS

Selective filtration is yours under all operating conditions with CFC Honan-Crane Multi-Cartridge Filters. Through years of research and field experience, CFC engineers have developed a full range of filter media to meet your job requirements in: cutting, grinding, quenching and rolling-mill oils; water-based coolants; hydraulic oils; fuel and lubricating oils; air filter oils. Determine the job requirements first—nature and degree of contaminants, viscosity and temperature, clarity and flow rate. There is a CFC high efficiency filter cartridge to do the job.

In addition to the complete flexibility of filter media, CFC Filters have quick-opening covers, and can be equipped with electric, steam or hot water heat. Auxiliary equipment, such as pumps, motors

and electric controls, may be included with either stationary or portable filters.

CFC Multi-Cartridge Filters give you dependable, money-saving protection against wear and breakdown due to contamination. You quickly save enough through reduced maintenance and improved efficiency to pay the low initial cost of these filters which are available in a full range of sizes from one to twenty-four cartridges.

A Commercial Filters engineer will gladly demonstrate how you can increase production and save money by installing these modern Multi-Cartridge Filters. Call your nearest Commercial Filters representative or sales office—or write to Department MA for technical literature.

### Micro-Fine Filtration for Low Cost Clarity



## COMMERCIAL FILTERS CORPORATION

MELROSE 76, MASSACHUSETTS

Plants in Melrose, Massachusetts and Lebanon, Indiana

FULFLO FILTERS WITH GENUINE HONEYCOMB FILTER TUBES FOR CONTROLLED MICRONIC CLARITY • CFC MULTI-CARTRIDGE OIL FILTERS • FULFLO INSULATING OIL CONDITIONERS • DRI-PURE WATER-OIL SEPARATORS • PRE-COAT FILTERS • MAGNETIC SEPARATORS



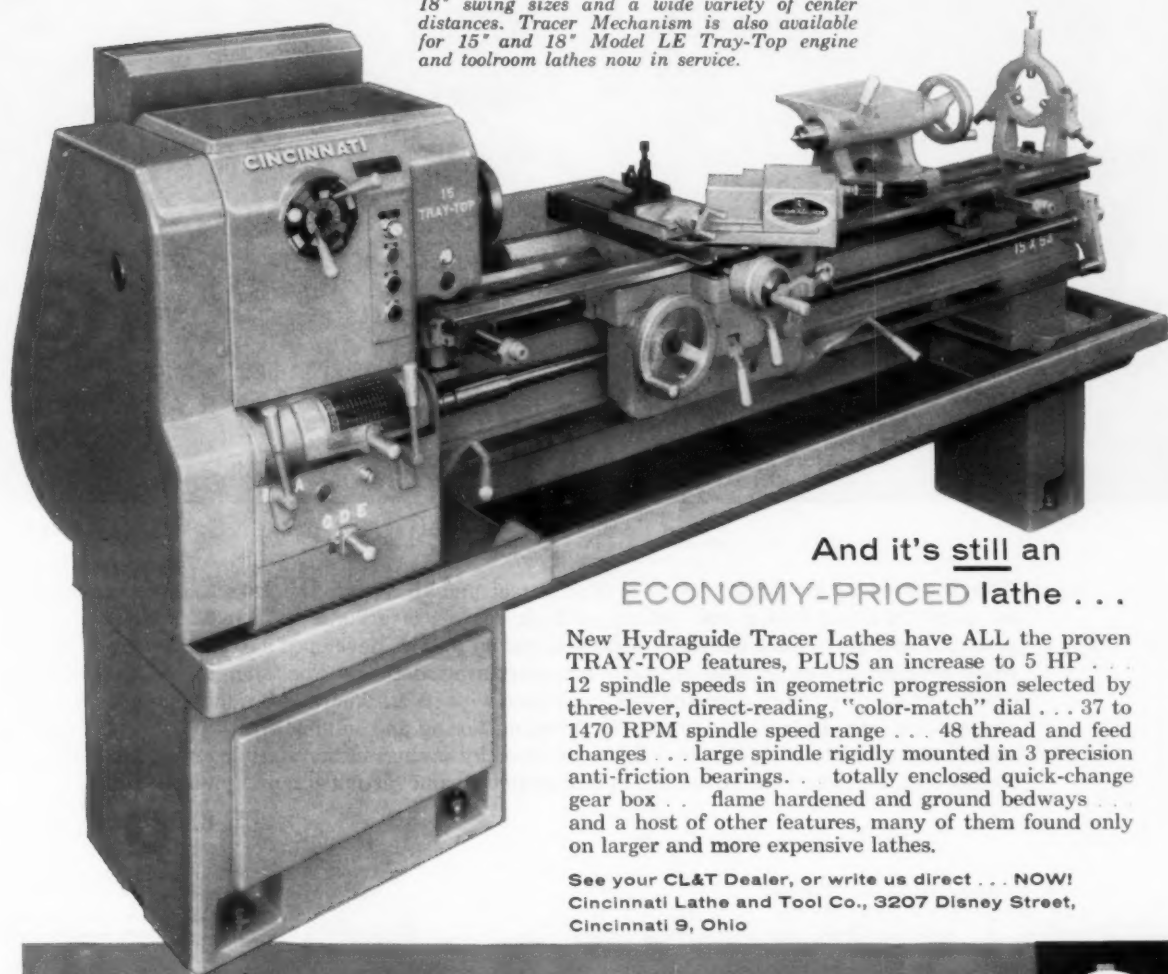
# OUT IN FRONT

location of all controls, template and tools on the new

## CINCINNATI HYDRAGUIDE TRACER LATHES

provides maximum convenience and safety for the operator, yet does not interfere with standard lathe operations. Just push a single button and you switch to full tracer machining, or back to standard. Compact design has all tracer mechanisms on the carriage . . . no added floor space is required. And the increase to 5 HP gives you greater productivity at every turn!

*Hydraguide Tracer Lathes are built in 15" and 18" swing sizes and a wide variety of center distances. Tracer Mechanism is also available for 15" and 18" Model LE Tray-Top engine and toolroom lathes now in service.*



And it's still an  
ECONOMY-PRICED lathe . . .

New Hydraguide Tracer Lathes have ALL the proven TRAY-TOP features, PLUS an increase to 5 HP . . . 12 spindle speeds in geometric progression selected by three-lever, direct-reading, "color-match" dial . . . 37 to 1470 RPM spindle speed range . . . 48 thread and feed changes . . . large spindle rigidly mounted in 3 precision anti-friction bearings. . . totally enclosed quick-change gear box . . . flame hardened and ground bedways . . . and a host of other features, many of them found only on larger and more expensive lathes.

See your CL&T Dealer, or write us direct . . . NOW!  
Cincinnati Lathe and Tool Co., 3207 Disney Street,  
Cincinnati 9, Ohio



center on

cincinnati lathes and drills

ENGINE, TOOLROOM, TRACER AND FIXED GAP BED LATHES AND A COMPLETE LINE OF DRILLING MACHINES



**T. R. DREYER**, Vice President—Brooklyn Manufacturing  
American Machine & Foundry Company

## **a man who came to Fair Street**



**"The JIGMIL Technique enabled us to establish new manufacturing methods which provided greater accuracy, improvement in our product, substantial reductions in assembly time, and major reductions in machine time, all without investment in jigs."**

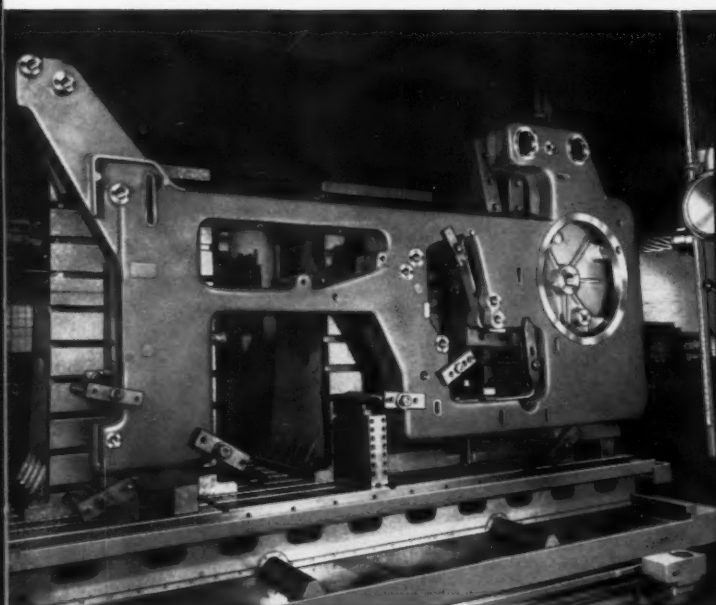
"We accepted an invitation to go to Fair Street and there saw the JIGMIL Technique in operation doing boring and milling to high degrees of accuracy and economy. The potential savings in our own plant became apparent and we developed a JIGMIL program which resulted in new economies in our manufacturing methods. The inherent accuracy, power and rigidity of this machine tool, combined with its automatic positioning and ease of operation are especially adaptable to precision boring and milling operations on side frames and gear boxes. In addition to the noteworthy savings in boring time and reduced tooling cost, we gained the advantage of milling in the same setting at a minimum of cost."

**T. R. DREYER**

**DEVLIEG MACHINE COMPANY, 450 FAIR STREET, FERNDAL • DETROIT 20,**

## SOME OF OUR JIGMIL USERS

Aerojet-General Corp.  
American Can Co.  
Avco Manufacturing Corp.  
Baldwin-Lima-Hamilton Corp.  
Beech Aircraft Corp.  
Boeing Airplane Co.  
Boyar-Schultz Corp.  
Carrier Corp.  
Clark Equipment Co.  
Continental Can Co., Inc.  
Convair, A Division of General Dynamics Corp.  
Crankshaft Machine Co.  
The DeLaval Separator Co.  
Detroit Broach Co.  
Douglas Aircraft Co., Inc.  
Eastman Kodak Co.  
Emco Manufacturing Co.  
The Falk Corp.  
Foote-Burt Co.  
Goss Printing Press Co.  
Grumann Aircraft Engineering Corp.  
Hamilton Ltd., Division, United Aircraft Corp.  
Hardinge Bros., Inc.  
The Heil Co.  
Illinois Tool Works  
Ingersoll-Rand Co.  
LeTourneau-Westinghouse Co.



## A FEW PROVEN ADVANTAGES OF THE JIGMIL TECHNIQUE—

- Eliminates cost of expensive jigs and production delays resulting from their manufacture.
- Simplifies tooling.
- Employs automatic functions to reduce factors of human error even in close tolerance work.
- Makes possible greater flexibility of product design.
- Improves end product by permitting interchangeable assembly of parts without hand fitting.
- Increases production and product accuracy.

**ACCURACY IS AN ECONOMY!**

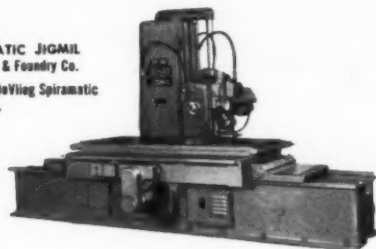
## A TYPICAL EXAMPLE OF JIGMIL VERSATILITY

AMF uses the JIGMIL Technique for machining a multitude of components for their cigarette making machines, bread-wrapping machines, automatic pin setters, cigar making machines and many others. Illustrated is a pair of bread-wrapper side frames set against angle blocks on a Model 4B-96 SPIRAMATIC JIGMIL. All boring and side milling operations were done on the JIGMIL in one setup. Previous time on conventional boring and milling machines was 10 hours per part. Time on the JIGMIL is 3 hours per part.

The Glenn L. Martin Co.  
Michigan Tool Co.  
North American Aviation, Inc.  
Northrop Aircraft, Inc.  
Otis Elevator Co.  
Pratt & Whitney Aircraft Division, United Aircraft Corp.  
Solar Aircraft Co.  
Speco Division, Kelsey-Hayes Co.  
Thompson Products, Inc.  
United Shoe Machinery Corp.  
Western Electric Co., Inc.  
Yale and Towne Manufacturing Co.  
York Corp.

**WILL YOU BE THE NEXT TO VISIT FAIR STREET**

Model 4B-96 SPIRAMATIC JIGMIL  
as used by American Machine & Foundry Co.  
For complete information on DeVlieg Spiramatic  
Jigmils, send for new catalog.



**MICHIGAN**



# DeVlieg

## SPIRAMATIC JIGMILS®

ACCURATE HOLES IN PRECISE LOCATIONS

**Another MINSTER First in Press Design  
Operating in Production Lines Since 1953  
Has Proved That You Can Get**

## **More Single Stroke Operations**

The exclusive "hidden value" in the Minster MS2 press is Minster's patented Intermediate Shaft Combination Air Friction Clutch and Brake Drive arrangement.

This drive arrangement makes it possible to get a higher single stroke efficiency, based upon rated continuous press speed, and the widest speed selection ever available on large double geared straight side presses.

### **Here's what this exclusive Minster feature can mean to you**

- More production on manually fed or automated presses.
- Faster starting and stopping . . . more single stroke operations per minute.
- Less flywheel energy loss . . . lower power consumption.
- Reduced clutch wear . . . less maintenance and adjustment.
- You may select either the faster speeds of a conventional single geared machine or the slower speeds of a double geared press. Two-speed drive (optional) allows selection of a speed to fit different type operations.

### **How it works:**

MS2 presses are double geared and have twin drive gears on the crankshaft. Minster's patented Combination Air Friction Clutch and Brake unit is mounted on a slower turning *intermediate shaft* instead of within the flywheel on the high speed drive shaft.

This means lower contact speed of clutch friction surfaces, resulting in very little heat on linings and less wear.

Flywheel can be run at maximum RPM for maximum energy without limiting speed of operations.

### **Additional Minster MS2 Press Features**

Minster Recirculating Oil Lubrication system provides continuous oil film on all bearing surfaces . . . allows closer bearing and gib clearances for reduced lash and better slide guiding.

All air, lubrication and electrical systems are complete, enclosed within the press frame line, yet easily accessible. Electrical circuits and pneumatic systems for manual or automated production. Controls mounted within cabinet type uprights.

Massive, box type, four-piece tie rod frame for rigidity.

Precise slide to bed parallelism. Slide fully guided within gibs before midstroke is reached.

Outboard drive sheave for easy belt changing.

All wear surfaces bronze-lined, precision fitted and replaceable.



**Per Minute**



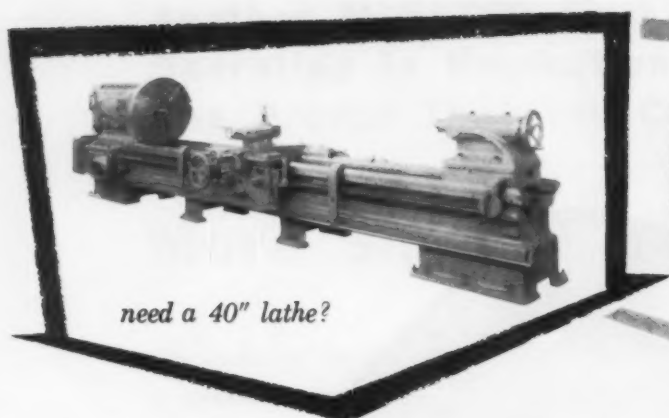
**MINSTER®  
MS2 Presses**

**150 TO 500 TON  
CAPACITIES**

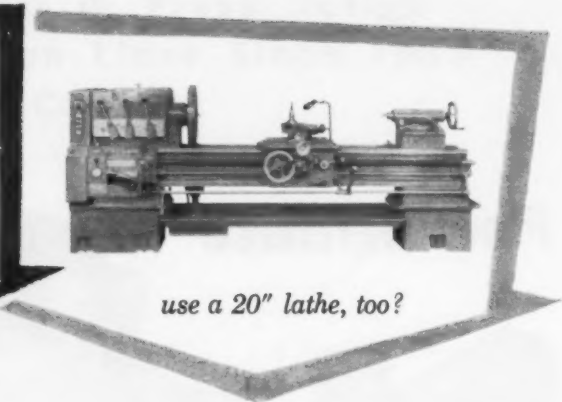
in five widths R to L in each  
capacity—two F to B dimen-  
sions in each capacity.

Dimensions meet  
J.I.C. Standards

**THE MINSTER MACHINE COMPANY  
MINSTER, OHIO**

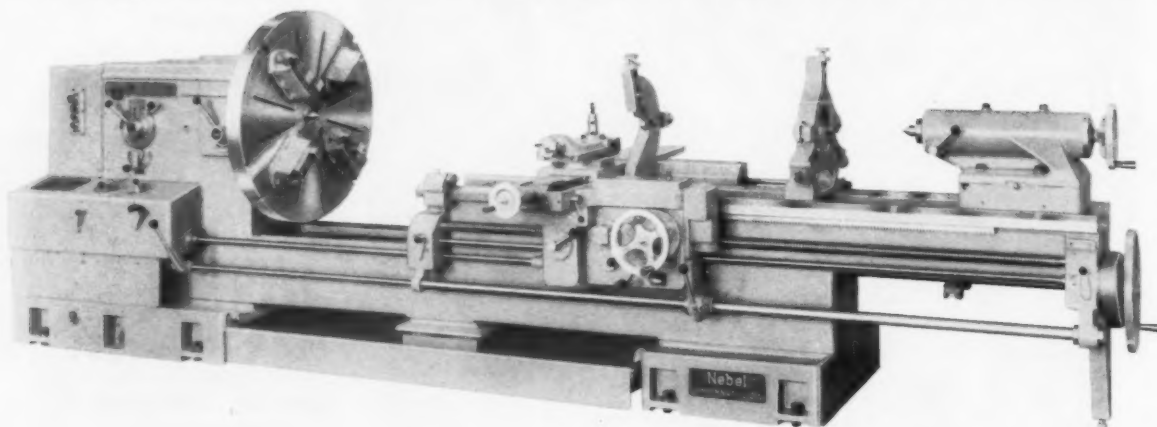


*need a 40" lathe?*



*use a 20" lathe, too?*

## Why buy 2? One Nebel will do!

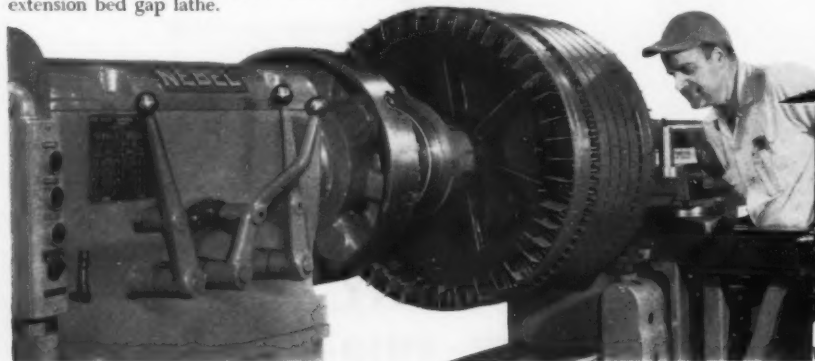


**Save money** on initial investment . . . with the Nebel extension bed gap, the one lathe that does the work of two . . . occupies the floor space of one machine . . . requires just one investment.

**Make money** with the Nebel extension bed gap lathe. Because it offers adjustable swing and center distance capacity, it can be the most useful and the most frequently used lathe in your plant. Use it as a gap lathe—as a standard lathe—and even as a vertical boring mill.

**Check Nebel** extension bed gap lathes. Made in three sizes: AG 20"/40" medium duty, G 28"/50" heavy duty and XB 20"/40" heavy duty. Or Nebel removable block gap lathes; made in 16"/27", 20"/30" and 25"/40" sizes. Write for free descriptive bulletins. Nebel Machine Tool Corp., 3410-A Central Parkway, Cincinnati 25, Ohio.

**Room to spare:** 32" diameter, 4500-lb pump rotor swings easily in the wide, deep gap of the Nebel series AG 20"/40" extension bed gap lathe.

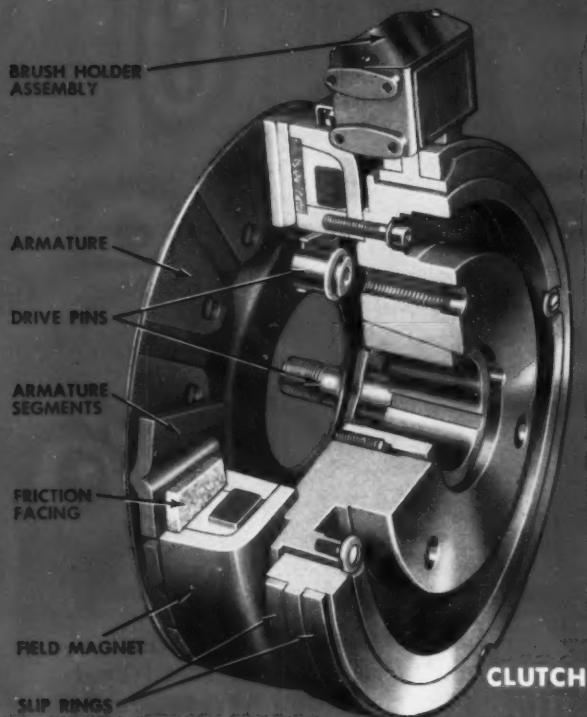


WORKHORSE OF METALWORKING SHOPS SINCE 1889

# The New **EATON** **Dyna-TORQ**

**MAGNETIC-FRICTION CLUTCHES, BRAKES,  
CLUTCH-BRAKES, CLUTCH-COUPPLINGS**

**Are the Accurate, Trouble-Free Means of Controlling  
Power and Motion in Modern Stop-and-Go Machines**



The Eaton Dyna-torQ electro-magnetic friction units include a number of unique design advancements which provide longer life and superior performance with less maintenance. Check the following important advantages:

- 1 Extremely Rapid Response in Clutching and Braking**—makes Dyna-torQ units ideally suited to a wide range of manual and automatic cycling applications.
- 2 Smooth, Shockless Engagement**—permits rapid operation without backlash or chatter.
- 3 Highly Effective Cooling**—maintains lower operating temperatures; permits fast, repetitive actuation.
- 4 Self-Adjustment**—automatically maintains proper clearance between armature shoes and field magnet.
- 5 Simple, Accurate Control**—manual or automatic; may be had to operate on 110, 220, or 440 volt, 60 cycle, alternating current.
- 6 Low Maintenance Costs**—result from unique design features and superior quality of construction, assuring long operating life and minimum down-time.

Eaton Dyna-torQ Clutches and Brakes are electrically operated, disc-type friction units having two basic components: a field magnet and an armature. Torque is transmitted as the magnet pulls the armature into engagement. Because the pull of the magnet is direct without intricate linkage, and the movement of the armature is slight, Dyna-torQ units are capable of extremely rapid response in clutching or braking.

Ask us to tell you how these Dyna-torQ units will fit your equipment.



**WIDE RANGE OF SIZES AND CAPACITIES**

*Send for Illustrated Descriptive Literature*

# EATON

**—DYNAMATIC DIVISION—  
MANUFACTURING COMPANY  
3307 FOURTEENTH AVENUE • KENOSHA, WISCONSIN**

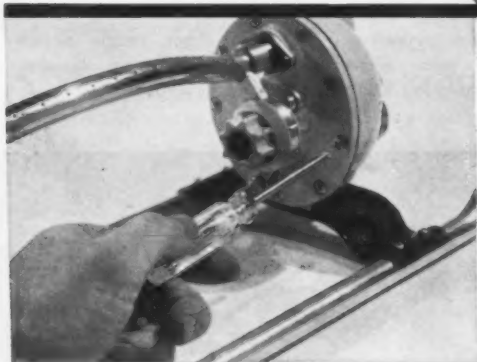
# Investigate the assembly savings made possible by **P-K** self-tapping screws



Because P-K Type A Self-tapping Screws have clean, deep slots and sharp gimlet points . . . and because they are consistently uniform, Reznor Mfg. Co. enjoys important savings in the assembly of their gas heaters.



To hold the plastic handle halves of their Instant Heat Soldering Irons together, The Lenk Mfg. Co. specifies P-K Type F Self-tapping Screws. No need for a separate tapping operation. Production is increased and costs reduced—thanks to P-K Screws.



Melnor Industries, Inc. (formerly Melnor Metal Products Co.) puts assembly strength into their famous "Swingin' Spray" oscillating lawn sprinkler by fastening zinc and aluminum parts with P-K Self-tapping Screws—7 Phillips Head Type Z and 18 Type F. They start right . . . drive right . . . and stay tight.

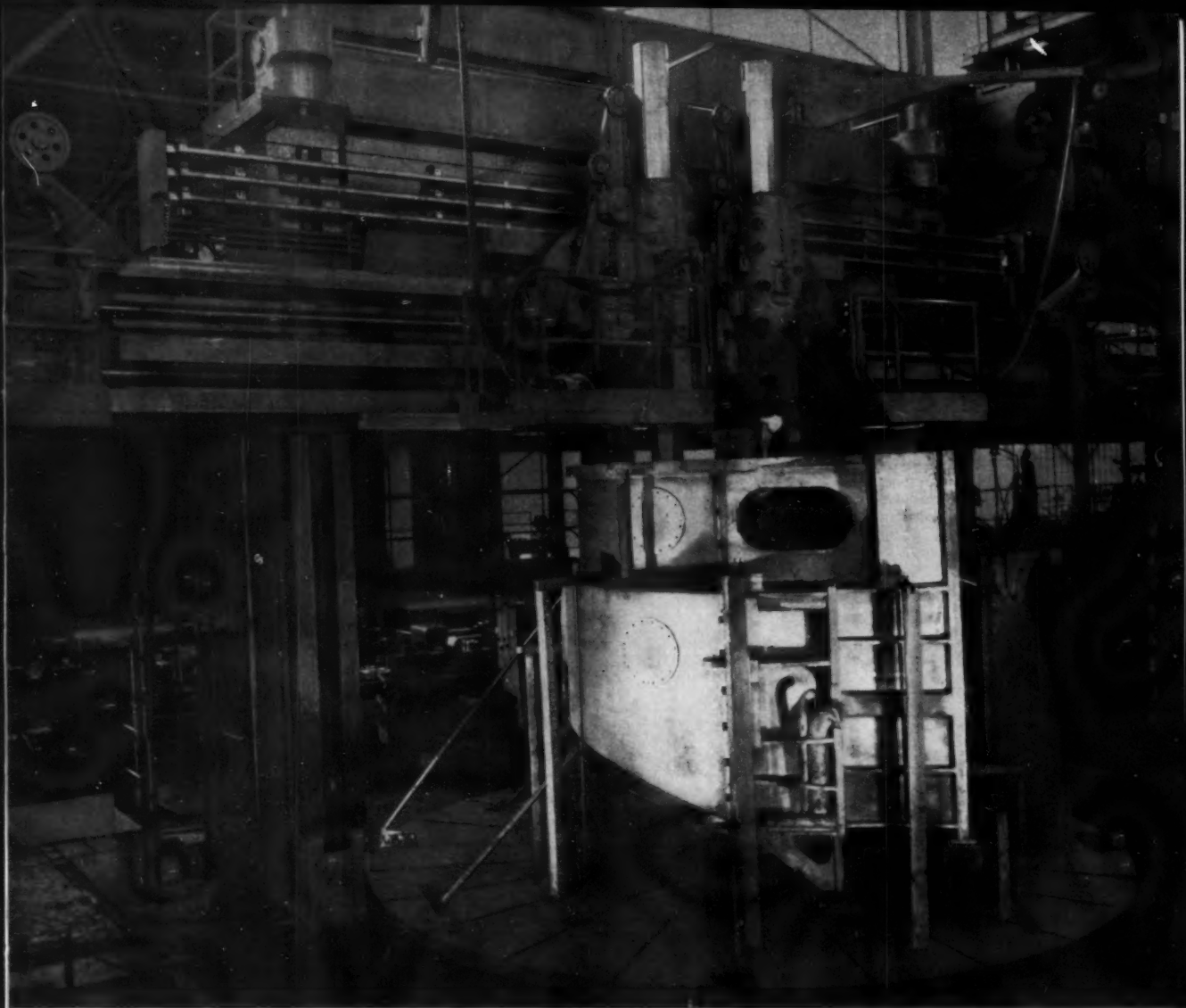
*PARKER-KALON DIVISION, General American Transportation Corporation  
Manufacturers of Self-tapping Screws, Socket Screws, Screwnails, Masonry  
Nails, Wing Nuts and Thumb Screws*

## **PARKER-KALON**® fasteners

*Sold Everywhere Through Leading Industrial Distributors*

*Factory: Clifton, New Jersey—Warehouses: Chicago, Illinois—Los Angeles, California*





## Mammoth 24 ft. Niles boring mill recently installed at Blaw-Knox, E. Chicago

One of the largest boring mills ever installed in the Greater Chicago area was put into operation recently in the Foundry & Mill Division of the Blaw-Knox Co. To meet the customer's exacting specifications, this huge Hamilton-built Niles machine tool is equipped to provide 16 changes of both bar and saddle feed, in a range from .005 to 1 in. per revolution of table. All speeds and feeds are controlled electrically from a convenient push-button pendant.

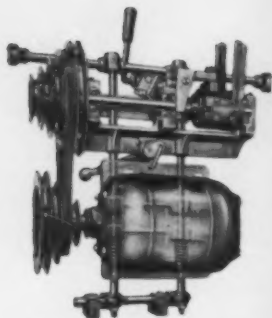
This mill can accommodate work pieces up to 320,000 lb. at all table speeds (from .16 to 18 rpm). Its double pinion drive is powered by two 125 hp d-c motors, with rpm adjustable through a 300/1200 range. Many other features of this precision-made machine tool add up to the maximum in efficiency and work output. Let us discuss your next machine tool requirement with you; our experience over a century could save you thousands of dollars.

**Hamilton Division** Hamilton, Ohio

**BALDWIN · LIMA · HAMILTON**

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools





Note heavy-duty construction of the 10-speed countershaft . . . the six ball bearings for smoothness and long service. Also available with heavy-duty variable speed countershaft.

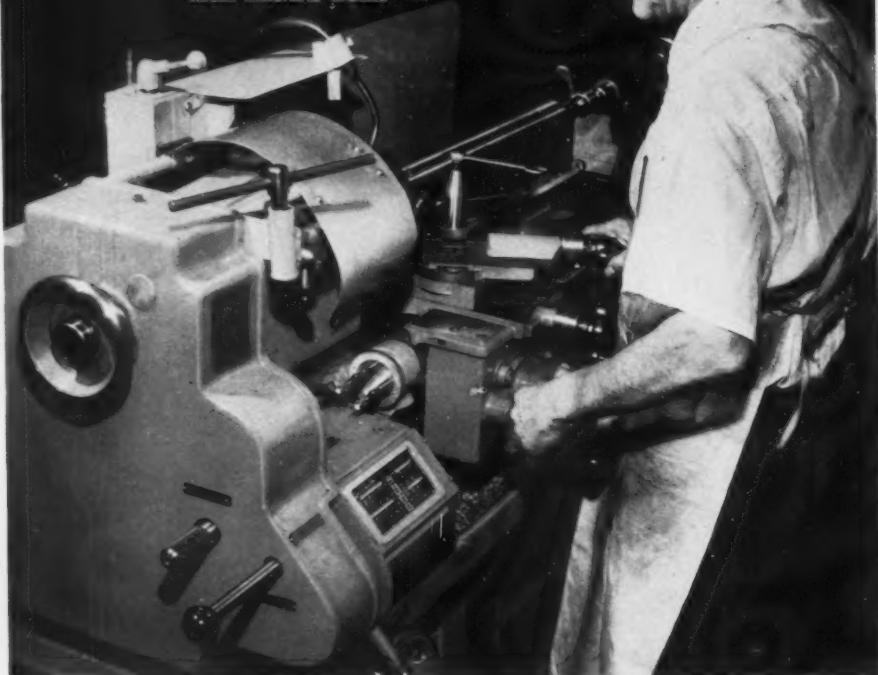


Flame hardened bed ways are standard equipment at no extra cost—a feature that costs many dollars more in other lathes in the Clausing class.

#### HERE'S PROOF OF PERFORMANCE:

"We purchased our 6300 series lathe primarily because of its low price, and were we surprised! This machine has more 'guts' than most of our machines costing 3 and 4 times as much."

BROM MACHINE WORKS



## BOUGHT on price—PRAISED for performance "CLAUSING 6300 LATHE out-performs expensive machines"

Write  
for free  
Literature

The reaction of Brom Machine Works to the performance of their Clausing lathes is typical. It is not unusual for purchasers of Clausing lathes to get much more for their money than they had expected—Clausing 6300-series 12½" lathes *do* set the standards for accuracy, efficiency and value in their price and capacity range. Here are a few of the reasons why.

Flame hardened bed ways are standard equipment *at no extra cost* on Clausing lathes. Headstock, apron and quick-change box are totally enclosed and gears and shafts travel in bath of oil—another important exclusive. Spindle is forged steel with 1½" bore, hardened and ground ASA—L-00 tapered key-locked nose. Spindle turns on Timken zero precision tapered roller bearings. Tailstock has No. 3 MT ram.

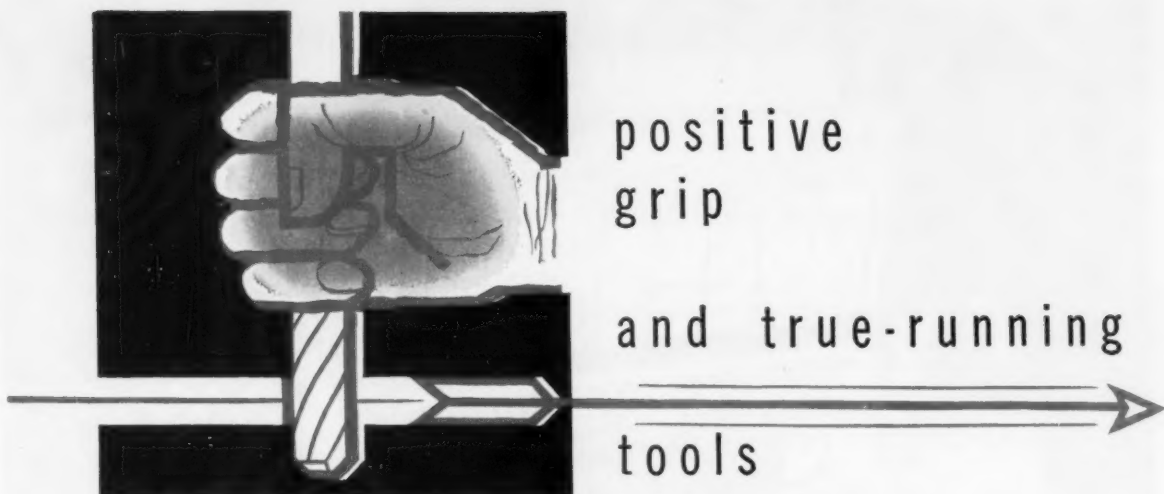
And superior performance is assured by more than superior features. Before it leaves the factory each Clausing lathe must pass rigid tolerance tests such as: spindle nose run out 0 to .0003" TIR, spindle taper run out at end of 12" test bar, 0 to .0006". The individual test report accompanying each lathe is an assurance it will machine with *dependable* precision. Compare *all* the features. Compare price. See for yourself why Clausing is acclaimed an outstanding lathe value—the lathe for *your* shop.



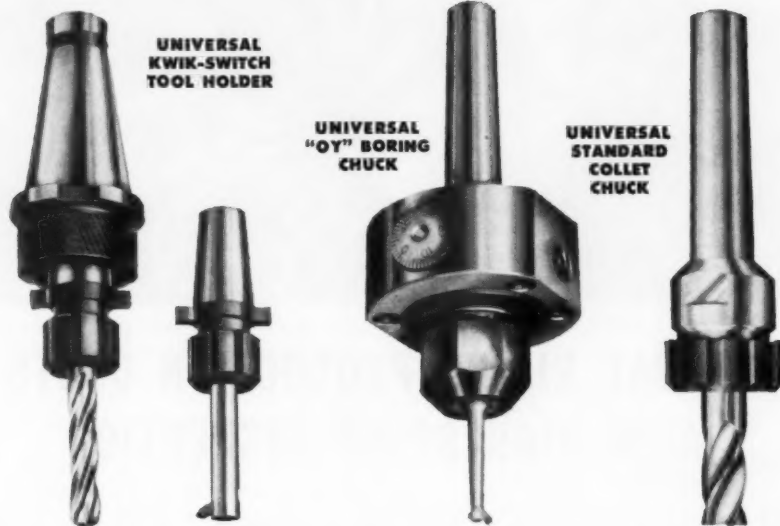
### CLAUSING DIVISION

ATLAS PRESS COMPANY

11-108 N. PITCHER ST. • KALAMAZOO, MICHIGAN



## ARE CERTAIN WITH UNIVERSAL CHUCKS SUCH AS THESE:

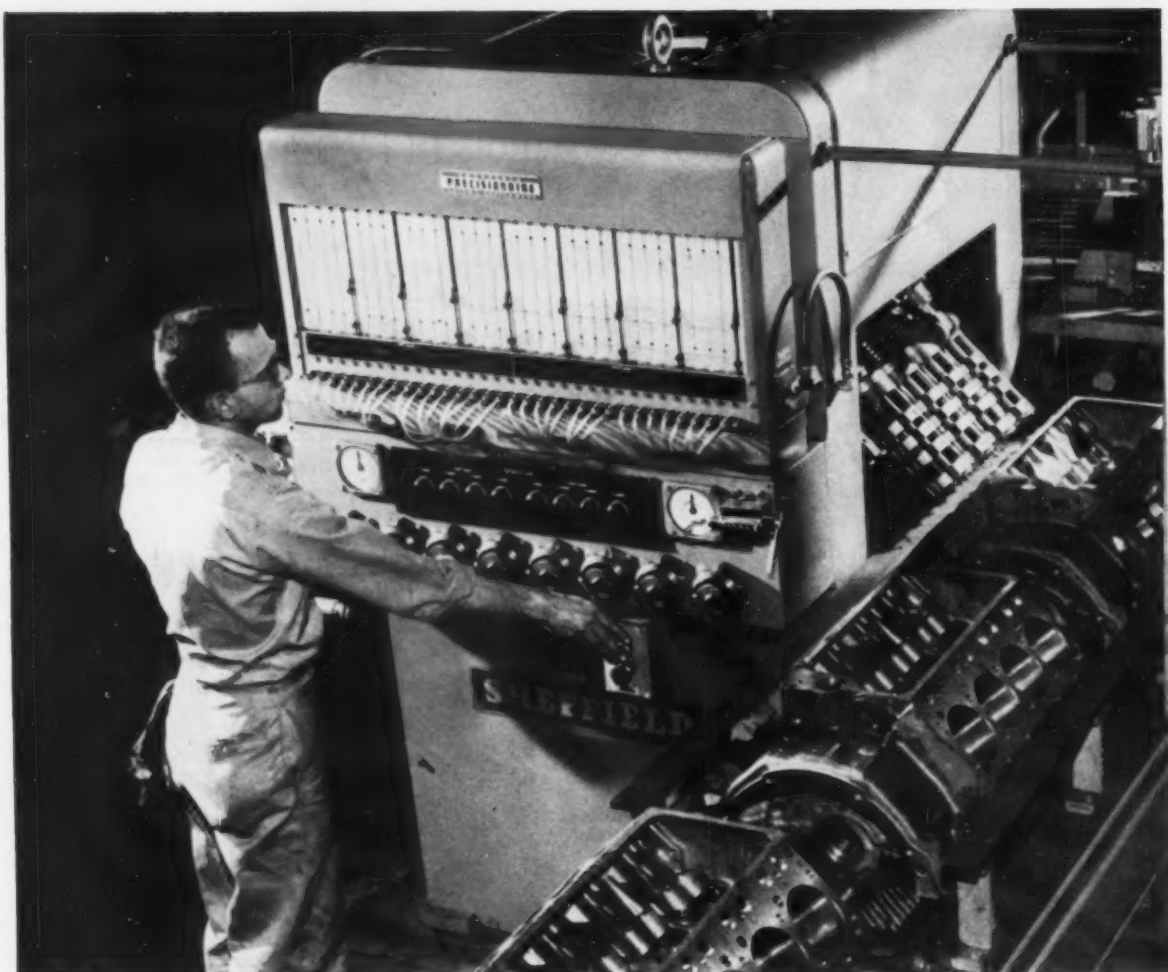


A sure, solid grip on tools is provided by the wrap-around action of Universal chucks because the slotted collet grips the tool on a continuous surface the full length of the collet. This positive grip, plus the precision manufacturing of all Universal chucks, keeps tools running true to .001" within an inch from the nose of the chuck. Our simplified chuck

design eliminates auxiliary bearings, resulting in low cost to you. Sizes range from  $\frac{1}{16}$ " to  $1\frac{1}{2}$ ", with shanks to fit any machine. For complete information on these three or other Universal chucks, write the office nearest you: Universal Engineering Sales Co., 1060 Broad St., Newark, N. J., 5053 Sixth Ave., Kenosha, Wis., or our home office in Frankenmuth.

**UNIVERSAL  
ENGINEERING  
COMPANY**

FRANKENMUTH 2, MICHIGAN



## COMBAT RISING PRODUCTION COSTS WITH HIGH SPEED INSPECTION

Gaging is an essential manufacturing operation just as machining is. Both contribute to manufacturing costs. When, through improved methods, either can be done faster, more effectively and with less effort, production costs drop.

A case in point is this Sheffield Precisionaire which checks 32 dimensions simultaneously at the rate of approximately 60-75 cylinder

blocks per hour. The size classification of each bore is stamped on the block. Thus, with selective assembly, broad manufacturing tolerances do not jeopardize precision fits.

This is one of the many cost-saving achievements of Sheffield's Auto-metrologists. Others involve any possible combination of Automatic Gaging with:

- Machine Control

- Sensing and Prediction
- Feedback
- Sorting by Classification Category
- Completely Automatic Assembly

If you contemplate reducing your costs through automation, utilize the ingenuity and resourcefulness of Sheffield's large staff of Auto-metrologists. Write to the Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 9.

7908

*the* **SHEFFIELD** *corporation*  
 manufacture and measurement for mankind  
 of BENDIX AVIATION CORPORATION



# ... Fluid Power

# news

REPORT  
NO. 11,601  
GREATER  
POWER FOR  
EXPANDERS  
—  
SHRINKERS

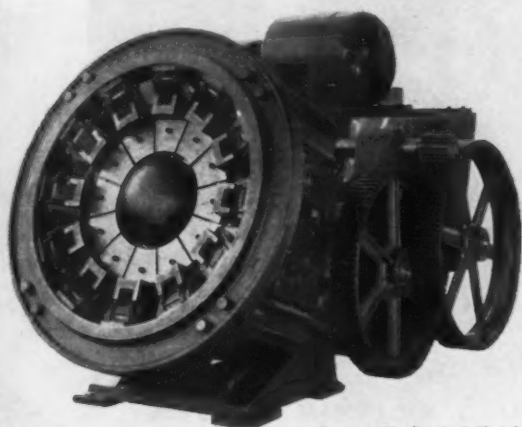
From Oilgear Application-Engineering Files

## HOW OILGEAR HEAVY-DUTY POWER-PAKS EXTENDED WORKING RANGE OF GROTNES MACHINES

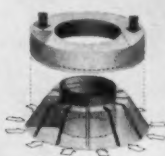
**CUSTOMER:** *The Grotnes Machine Works, Chicago, Illinois.*

**DATA:** Grotnes expanders and shrinkers are used for forming and sizing sheet metal parts and heavy rings to tolerances of  $\pm .002"$  without heat, machining, or waste. Any continuous cross-section part (square, round, oval, etc.) is expanded over jaws mounted in a slotted table. The jaws are moved radially outward by a drawbar-actuated cone, forming or sizing the part by stressing the metal beyond its yield point to induce

a permanent set. In shrinking, the jaws are forced inward against the part by a tapered ring or toggle links. World-wide acceptance of this unique method has led to industrial requests for Grotnes machines with greater working forces, longer strokes, more uniform power than are practical or possible with mechanical drives using gear trains and crankshafts.

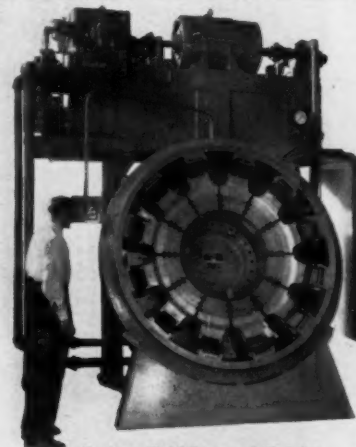
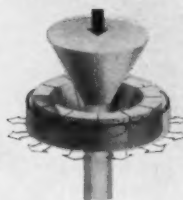


Grotnes Mechanical Shrinker



Grotnes  
Shrinking  
Method

Grotnes  
Expanding  
Method



Grotnes Fluid-Powered Shrinker

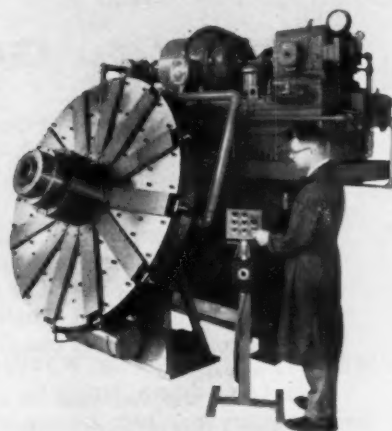
**SOLUTION:** Shown above are two Grotnes shrinkers—one mechanically powered, the other Oilgear Fluid Powered for greater tonnage, longer stroke, more uniform power. Note the neat appearance of this new unit with its convenient, simple panel for precise, automatic control. Shown, right, is one of a new line of Grotnes expanders designed specifically for Fluid Power operation. Capacities range up to 1,580 tons on the new expanders; to 800 tons on the new shrinkers—based on 3,000 psi pressure provided by Oilgear application-engineered Heavy-Duty Power-Paks. Performance and control on these new, larger machines has been so outstanding that Grotnes is now equipping expanders as small as 25 tons drawbar pull with Oilgear Power-Paks. This is just one example of Oilgear cooperation and teamwork with designers and builders of machines for industry. An Oilgear Power-Pak is more than just a clean-appearing, unitized assembly of a pump, motor, reservoir, valves and controls . . . it is an efficient, leaktight, easy-to-install, Heavy-Duty Fluid Power system based on over 35 years of pioneering-engineering-knowledge that provides: automatic, electric power conservation; precision-controlled pressures, positions, cycle times; dependable operation; unit responsibility for the entire power system. Because of Oilgear's long reputation for dependable, trouble-free Fluid Power for virtually any application, Oilgear has become a name that all industry trusts . . . and uses.

*For practical solutions to your linear or rotary drive and control problems, call the factory-trained Oilgear application-engineer in your vicinity. Or write, stating your specific requirements, directly to:*

## THE OILGEAR COMPANY

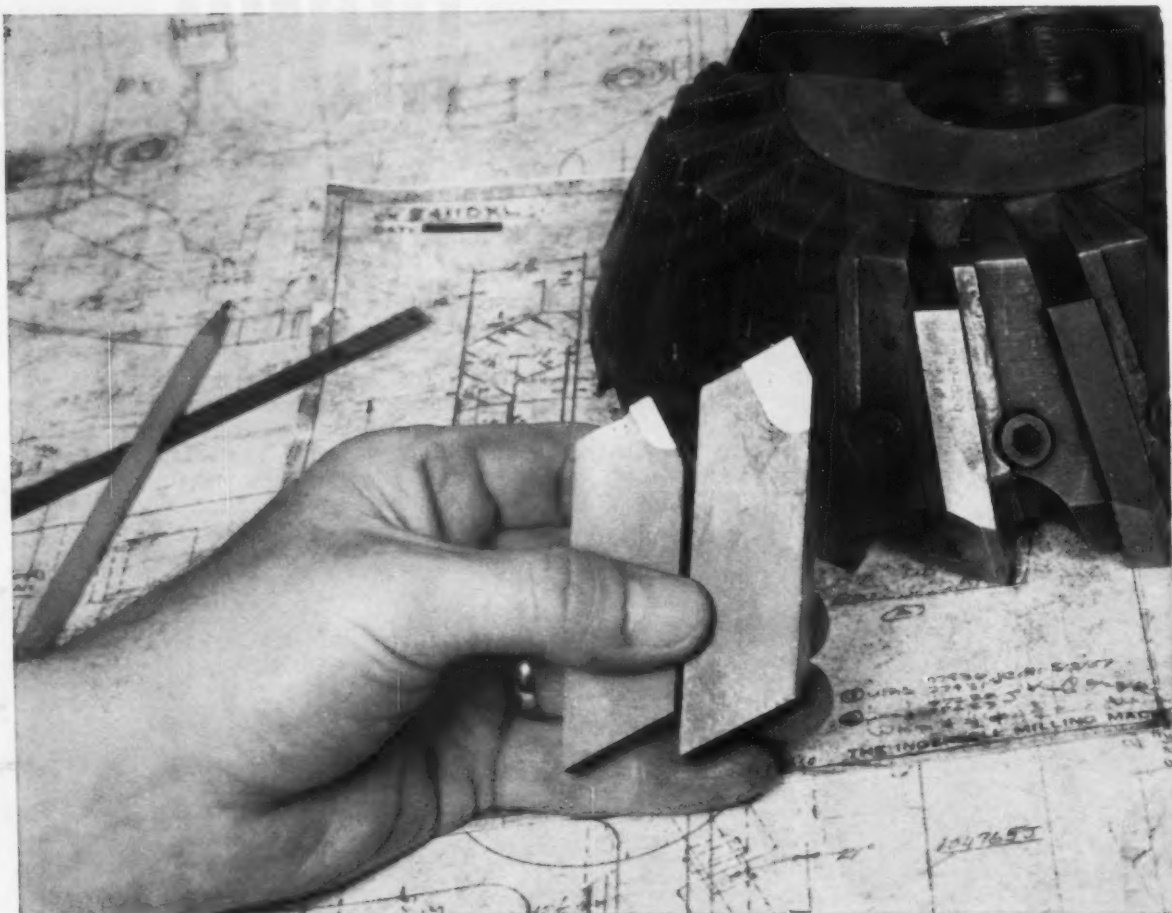
*Application-Engineered Fluid Power Systems*

1569 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN



Grotnes Fluid-Powered Expander

Oilgear application-engineered Power-Paks are also used extensively on hotplate, plywood, pulp-baling, injection molding, extruding, forming, and other presses. Oilgear rotary drive and control systems are equally well accepted in virtually every field of manufacturing and processing. For accurately controlled linear or rotary power . . . for the lowest cost per year . . . check with Oilgear!



*Ingersoll Cone-Type Face Mill for general purpose milling . . . designed for low replacement blade cost.*

## Do You Get Your Money's Worth?

Most of the carbide in the worn blade was used, but this in itself does not mean that it was used effectively. Many factors are involved in developing the lowest milling cutter cost consistent with improved finishes, faster feed rates and longer tool life.

A continuous review of these factors is part of the day-to-day responsibility of your Ingersoll cutter salesman and of the staff of milling experts he represents. This part of our product has proved its value to hundreds of concerns.

We will welcome an opportunity to tell you more about this service. Write:



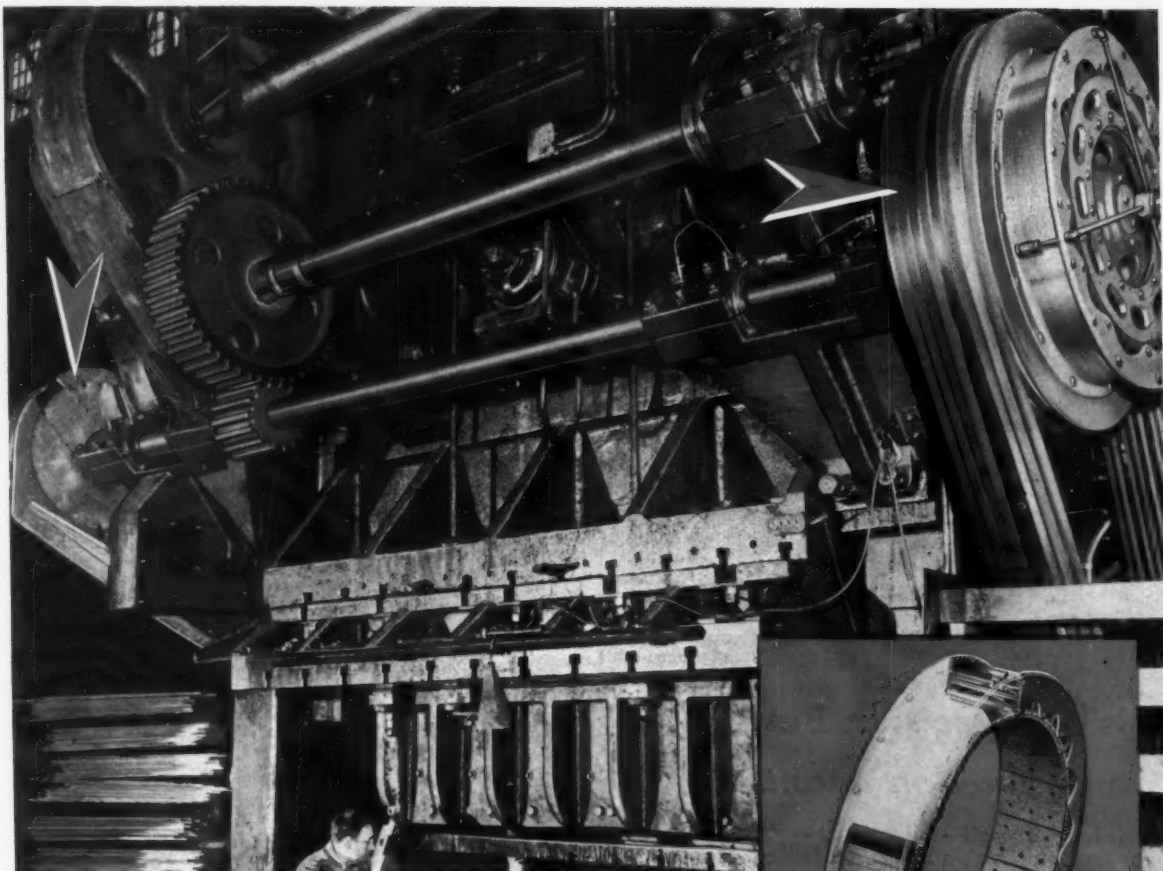
If you do not have a copy of this book, write us and we will send you one. It describes in detail the complete line of Ingersoll inserted blade milling and boring tools. Ask for Catalog #66B

## CUTTER DIVISION

**THE INGERSOLL MILLING MACHINE COMPANY**

505 FULTON AVENUE

ROCKFORD, ILLINOIS



**FAWICK AIRFLEX CLUTCH AND BRAKE  
KEEPS THIS GIANT PRESS ON-THE-JOB**

# building Pullman-Standard Cars

This 1200-ton press is used by Pullman-Standard in the production of freight cars for blanking and punching side and floor sheets, side stakes and hopper sheets at the rate of 80 to 100 per hour.

Tough spot for a clutch? . . . Sure, but FAWICK Airflex Clutches are designed and built for just such performance. This Pullman-Standard Airflex installation has *never* required maintenance.

Airflex Clutches and Brakes have made FAWICK the leader in making power behave . . . here's why:

increased production • maximum die protection • elimination of lubrication and mechanical adjustments • fingertip local or remote control • easy-accurate-selective "inching"



Fawick VC Ventrator Clutch and VC Ventrator Brake: key to trouble-free, cyclic operation and split-second starts and stops . . . on your presses!

**FAWICK AIRFLEX DIVISION  
FAWICK CORPORATION**  
9919 CLINTON ROAD • CLEVELAND 11, OHIO  
In Canada: Fawick Canada, Ltd., Toronto

*Performance is Proof . . . Fawick is Best*

For more information fill in page number on Inquiry Card, on page 221

**FAWICK Airflex**

**INDUSTRIAL CLUTCHES AND BRAKES**

MACHINERY, November, 1957—275

**in  
this  
line-  
up...**

there's a specific  
*Lapmaster*<sup>®</sup>  
to give you:

- 1 Precision Flatness
  - 2 Precision Finish
- in production quantities

Parts large or small—tall or squat—whatever the case may be, there's a Lapmaster tailor-made to meet your production requirements at the lowest possible cost per piece.

If you are now lapping by other means—hand scraping or grinding—it will pay you to investigate the Lapmaster. Our fully equipped lapping laboratory is at your disposal to analyze your problem, test run a number of pieces and furnish you with a complete production report without obligation.

"John Crane" Lapmasters are capable of consistently producing flatness to less than one light band (11.6 millionths of an inch), micro-inch finishes of 2 to 3 RMS on all materials including cast iron, steel, magnesium, aluminum, brass, carbon, ceramics and plastics.

Crane Packing Company, 6433 Oakton St., Morton Grove, Ill. (Chicago Suburb).

In Canada: Crane Packing Co., Ltd. 617 Parkdale Avenue, Hamilton, Ontario.

## Free data

These 3 booklets on *Production Lapping* and *Light Band Reading* are yours for the asking. Write today.



Model 12 handles 3  
4-in. dia. parts up to 705  
1/4-in. dia. parts per load.



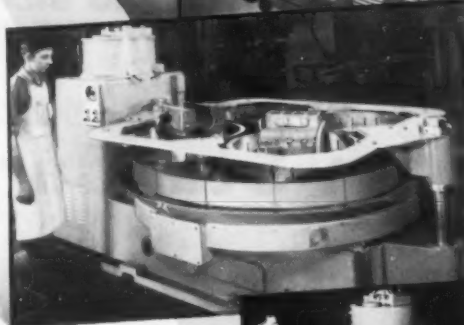
Model 24 handles 3  
9 1/2-in. dia. parts up to 3900  
1/4-in. dia. parts per load.



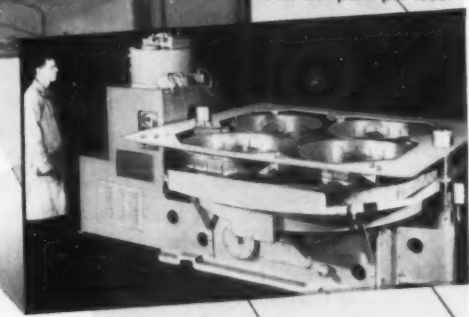
Model 36 handles 4  
13 3/4-in. dia. parts up to 4000  
3/8-in. dia. parts per load.



Model 48 handles 4  
17-in. dia. parts up to 940  
1-in. dia. parts per load.



Model 72 handles 4  
27-in. dia. parts up to 2480  
1-in. dia. parts per load.



Model 84 handles 4  
32-in. dia. parts up to 3500  
1-in. dia. parts per load.



MECHANICAL PACKINGS



SHAFT SEALS



TEFLON PRODUCTS



LAPPING MACHINES

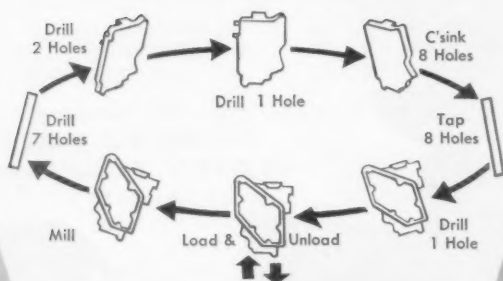


THREAD COMPOUNDS

**CRANE PACKING COMPANY**

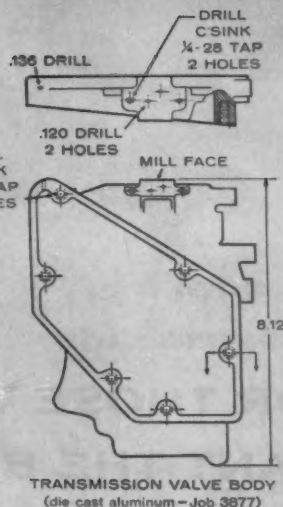


- drilled
- countersunk
- tapped
- milled



# 460 PARTS PER HOUR

(GROSS)



## ... on this 8-station **KINGSBURY** INDEXING AUTOMATIC

Eight fixtures are mounted on a 60-inch index table. The part is tipped back in each fixture so that the high speed (7200 rpm) milling operation is horizontal. Five vertical units on the central column operate on the holes in this milled face. Three angular units operate on the six mounting holes.

All units operate at once, while the operator is changing parts in his fixture. He presses buttons to actuate

the clamping, unclamping and indexing mechanisms. A Kingsbury indexing automatic is the best way to perform drilling types of operations

- ... at a high production rate
- ... at low unit cost
- ... with unvarying accuracy.

Kingsbury Machine Tool Corporation, Keene, N. H.

# KINGSBURY

**INDEXING AUTOMATICS**  
for high production drilling  
and tapping



10"-1" Collet Precision  
Toolroom Lathe Prices  
start at \$1628

10"-1" Collet Bench  
Engine Lathe Prices  
Start at \$1319

*A Better Buy*



## FOR THOSE WHO WANT THE BEST

Accuracy that's a match for any job . . . and any tolerances.  
Speed and handling ease for high output.  
Versatility for more jobs with less effort.  
Efficient machining that will hold down your costs.  
Optional features include Cam Lock Spindles, Long Taper  
Key Drive Spindles and Hardened and Ground  
Bed Ways for utility and service.

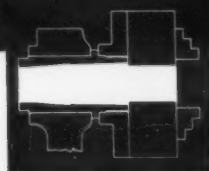
### Send for Free Catalog



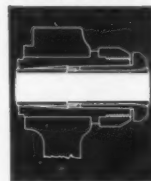
Describes 9" to  
16-24" Engine  
Lathes, 9" to  
16" Toolroom  
Lathes, Turret  
Lathes, Milling  
Machines, 7"  
Shapers, 14" Drill  
Presses, Pedestal  
Grinders,  
Attachments.

### SPECIFICATIONS

Swing . . . 10 $\frac{1}{2}$ " over bed and saddle  
wings.  
Distances between centers . . . 14" to 34"  
Collet capacity . . . 1" max.  
Spindle hole . . . 1 $\frac{3}{8}$ "  
Spindle speeds . . . 12 or 24, 27 to 1400  
r.p.m.  
Longitudinal feeds . . . 70 R.H. or L.H.  
Cross feeds . . . 70  
Thread cutting range . . . 70 R.H. or L.H.  
pitch—4 to 480 per in.



1 $\frac{3}{8}$ " Spindle Bore



1" Collet Capacity



Up to 24 months to pay.

# SOUTH BEND LATHE

BUILDING BETTER TOOLS SINCE 1906  
SOUTH BEND 22, INDIANA

## FORGING DIE

Material: Heppenstall 'A'  
Conventional Machining

Time: 40 hours

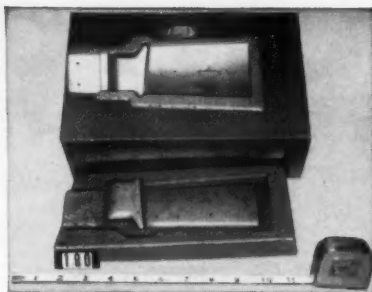
Elox Setup & Machining

Time: 8 hours

Saved: 32 hours

Machine tool: Elox Standard M-500  
Electrode: Cast Elo-met #3

Customers report 75% time saving  
in re-working dies after washout ...  
no annealing is necessary.

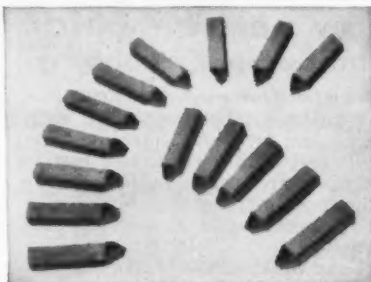


FROM  
THE  
HEART  
OF

EDM

## TUNGSTEN CARBIDE SINGLE POINT TOOLS

E D M produces 14 identically  
machined tools per hour. Times include  
roughing and finishing, machining  
both faces, nose radius and top.  
Radius held to  $\pm .001$ ". Tools were  
produced by 1 man operating 2  
Elox Tool & Cutter Grinders, using a  
brass wheel. Users report Elox  
ground tools give greatly increased  
life when compared to abrasive  
ground tools.



## EMBOSSING DIE

Material: Air Hardened Tool Steel

Die consists of 1,250 squares ma-  
chined  $.100" \times .030"$  deep in the  
bottom section of the die. Sharp  
corners on each square had to be  
maintained.

Conventional Machining

Time: 227 hours

Elox Setup & Machining

Time: 10 hours

Saved: 217 hours

Machine Tool: Elox Standard M-500  
Electrode: Free machining brass



... 4 jobs  
that prove

Elox  
puts you  
ahead of  
competition

## EXTRUSION DIE

Material: Air Hardened Tool Steel

Conventional

Machining Time: 4 hours

Elox Setup &

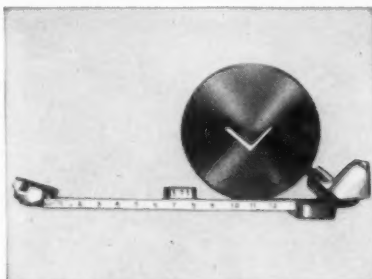
Machining Time: 1 hr. 38 min.

Saved: 2 Hrs. 22 min.

Machine Tool: Elox Standard M-500

Electrode: Free machining brass

Machining is done after final heat  
treating ... eliminating the possi-  
bility of distortion.



These jobs were done for Elox customers in our "Prove It" Division. There's more to them than just "man hours" saved. The Elox sales engineer in your area would like to give you all the details about these and other applications of Electrical Discharge Machining. Why not write ...

**elox** corporation of michigan  
EST. 1942

1833 N. Stephenson Highway  
Royal Oak 3, Michigan

# GET **GORTON** *and you* GET ALL THIS . . .

TOOL ROOM  
*accuracy* with

**HEAVY DUTY PERFORMANCE**  
... resulting in immediate economy!

**Features you should demand** . . . Square lock bearing guides with long length-to-width ratio between column and knee and knee and saddle; spindle motor drives spindle only with separate feed motor; designed for high-speed steel or carbide milling, either conventional or climb milling; dial-type horsepower load meter for spindle; interchangeable assembly unit construction; 100% mechanical and electrical overload protection for gears, cutter and work; removable coolant pan for easy clean-out and quick coolant change; unique spindle bearing cooling system — heat is dissipated and dispersed throughout column. Gorton *verticals* are also available for aircraft work with high cycle spindles and rapid table feeds; *horizontal models* can be had with super-speed vertical spindle head and ram assemblies. For high production, specify Gorton automatic cycling.

**Special tooling and machines** . . . Gorton specializes in custom-built tooling to convert standard models into special purpose machines, as well as the design and manufacture of high production, single purpose machines to precision standards. Ask us for our recommendations.

More usable power at the Spindle than in any comparable machine, due to superior gear train design.

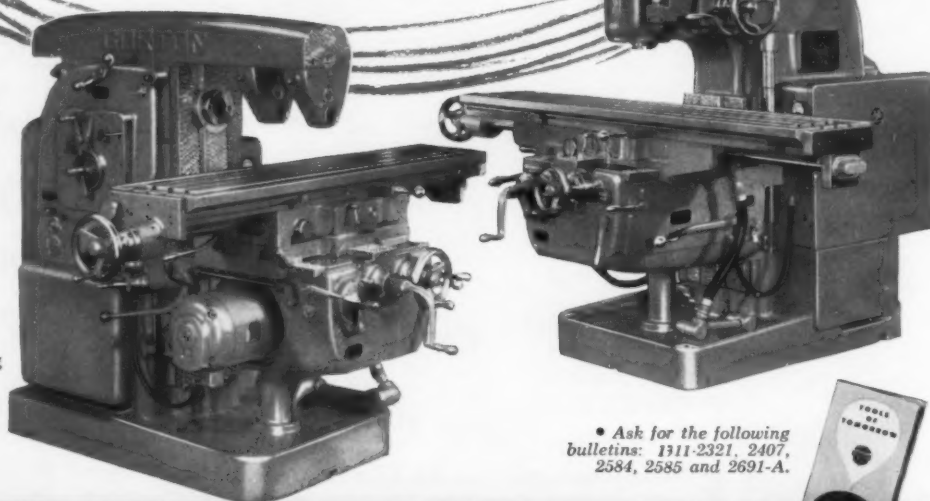
**PROOF** . . . check your stock removal against horse power consumed . . . a real test for any milling machine.

When you buy "Horse power," be sure it is *usable* horse power.

89

## COMBINATIONS

Plain-Type Mills  
Universal Mills  
Vertical Mills  
56" Tables  
62" Tables  
76" Tables  
28" Table Travel  
34" Table Travel  
48" Table Travel  
7½ to 25 H. P.  
Speed Ranges according to requirements  
Feed Ranges according to requirements



• Ask for the following bulletins: 1311-2321, 2407, 2584, 2585 and 2691-A.



**GEORGE GORTON MACHINE CO.**

1311 RACINE STREET • RACINE, WISCONSIN

SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.







# Heller

## ***solid carbide***

# Tools

*give more because they "give" less!*

**GREATER RIGIDITY PAYS OFF:** There's no spring or wobble as with carbide-tipped steel tools. So, longer life, higher speeds and smoother finishes are built into Heller Solid Carbide Tools.

**CHECK THESE SPECIFIC ADVANTAGES!** Heller Solid Carbide End Mills produce much finer finishes than tipped types. Heller Solid Carbide Drills increase production 40 to 50 times over high speed steel drills because of higher speeds. Heller Solid Carbide Reamers last as much as 50 times longer than steel reamers cutting hardened steels at Rockwell C-63.

**RESHARPENING SERVICE ADDS FURTHER LIFE!** Heller regrinds dull tools to restore them to original precision ... at a fraction of their original cost.

**COMPARE THE VALUE!** Tested against high speed steel tools with or without carbide tips, Heller Solid Carbide Tools clearly prove that they cost much less in the long run.

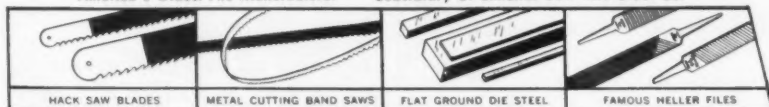


## Heller Tool Co.

NEWCOMERSTOWN, OHIO

America's Oldest File Manufacturer

Subsidiary of Simonds Saw and Steel Co.



HACK SAW BLADES

METAL CUTTING BAND SAWS

FLAT GROUND DIE STEEL

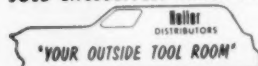
FAMOUS HELLER FILES

### HOLLER FOR HELLER

*for better cutting  
at lower cost!*

Whether it's solid carbide tools or job proved files you want, it pays to consider Heller first. **Oldest in filing experience, newest in cutting developments,** Heller is best equipped to match cutting tools to job requirements for maximum production at minimum cost.

SOLD EXCLUSIVELY THROUGH



**SERVICE + STOCKS = SAVINGS**

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—281

# Product Directory

To find headings easily, look for capital letters at top of each page to denote location.

## ABRASIVE CLOTH, Paper and Belt

Crane Packing Co., Morton Grove, Ill.

Gardner Machine Co., Beloit, Wis.  
Norton Co., 1 New Bond St., Worcester, Mass.  
Simonds Abrasive Co., Tacony and Fraley Sts.,  
Bridesburg, Philadelphia, Pa.

Norton Co., 1 New Bond St., Worcester 6,  
Mass.  
Simonds Abrasive Co., Tacony and Fraley Sts.,  
Bridesburg, Philadelphia, Pa.

## ABRASIVES, Disc

Carborundum Co., Niagara Falls, N. Y.  
Delta Power Tool Div., 400 N. Lexington Ave.,  
Pittsburgh 8, Pa.

ABRASIVES, Polishing, Tumbling, Etc.  
Crane Packing Co., Morton Grove, Ill.

## ACCUMULATORS, Hydraulic

Watson-Stillman Co., Roselle, N. J.

AIR GAGES, Dimensional—See Gages Air  
Comparator

## AIR GUNS

Chicago Pneumatic Tool Co., New York 17,  
N. Y.  
Schrader's Sons, A., 470 Vanderbilt Ave.,  
Brooklyn 38, N. Y.

AIR TOOLS—See Grinders, Portable,  
Pneumatic—Drills, Portable, Pneumatic,  
Etc.

## ALLOY STEELS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Carpenter Steel Co., Reading, Pa.  
Columbia Tool Steel Co., Chicago Hts., Ill.  
Crucible Steel Co. of America, Oliver Bldg.,  
Pittsburgh 30, Pa.  
Ryerson Joseph T. & Son, Inc., 2558 W. 16th  
St., Chicago 18, Ill.  
U. S. Steel Corp., Carnegie-Illinois Steel Corp.  
Div., 436 7th Ave., Pittsburgh, Pa.  
Vanadium Alloys Steel Co., Latrobe, Pa.  
Wheelock, Lovejoy & Co., Inc., Cambridge,  
Mass.

## ALLOYS, Bearing

Bunting Brass & Bronze Co., 715 Spencer,  
Toledo 1, Ohio  
Carpenter Steel Co., 105 W. Bern St., Reading,  
Pa.  
Crucible Steel Co. of America, Henry W. Oliver  
Bldg., Mellon Square, Pittsburgh 22, Pa.  
Mueller Brass Co., Port Huron, Mich.

ALLOYS, Non-ferrous—See Brass, Cop-  
per, Zinc and Stellite

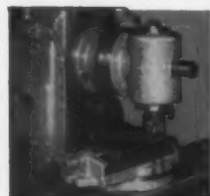
## ALUMINUM and Aluminum Products

Mueller Brass Co., Port Huron, Mich.  
Revere Copper & Brass, Inc., 230 Park Ave.,  
New York 17, N. Y.  
Ryerson & Son, Jos. T., 16th & Rockwell Sts.,  
Chicago 8, Ill.

ANGLE PLATES—See Set-Up Equipment

## ANNEALING FURNACES

Eisler Engrg. Co., 750 So. 13th St., Newark 3,  
N. J.  
Halcroft & Co., 6545 Epworth Blvd., Detroit  
10, Mich.



Heavy Duty Vertical  
Milling Attachment



Heavy Duty Offset  
Vertical Milling Attachment



Universal Milling Attachment



Toolmakers Overarm

## Heavy duty attachments increase versatility of dependable, low-cost GREAVES MILLS

"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer  
outstanding flexibility for all types of milling  
operations . . . with GREAVES MILLS.  
Make your own comparison of 22 specifications of  
Greaves and 7 other leading milling machines.



Extra size table  
with 34" travel optional  
at extra cost.

## GREAVES MACHINE TOOL CO.

2500 Eastern Avenue, Cincinnati 2, Ohio

Send Comparison Chart. I will make my own comparison  
of GREAVES MILLS with other makes.  
Send information on Attachments and Accessories for  
GREAVES MILLS.

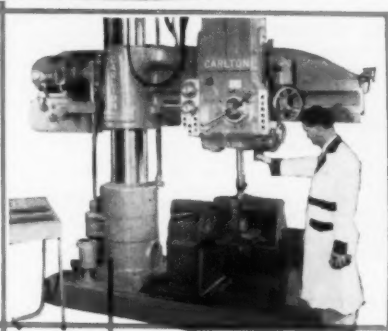
NAME \_\_\_\_\_ TITLE \_\_\_\_\_  
FIRM \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



**Chef Victor, Hotel Sheraton-Gibson,  
Cincinnati**

## **Specialists do the job better: Every chef has his specialty**

It's true when Chef Victor of Cincinnati's famed Hotel Sheraton-Gibson carves a bird; it's true when Carlton makes a radial drill. Because Carlton makes nothing else, Carlton can make radial drills better. Fact is, having concentrated exclusively on radial drill research, engineering and manufacturing since 1916, Carlton can offer a wider range of the most up-to-date radial drills ever developed. Name your need — arm lengths from 3-ft. to 12-ft.; column diameters from 9" to 26" — Carlton makes 'em better. Take your choice of Carlton speed-feed controls — programming, pre-select, partial pre-select or manual — and special bases, tables and jigs for additional productivity. The Carlton Machine Tool Co., Cincinnati 25, Ohio.



# Carlton

**SPECIALISTS IN RADIAL DRILLS**

**ARBOR PRESSES**—See Presses Arbor**ARBORS AND MANDRELS**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio  
Jacobs Mfg. Co., West Hartford, Conn.  
Kearney & Trecker Corp., Milwaukee 14, Wis.  
Logansport Mch. Co., Inc., Logansport, Ind.  
South Bend Lathe Wks., South Bend 22, Ind.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**ARC WELDERS**—See Welding Equipment, Arc**ASSEMBLING MACHINES**

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Robbins, Omer E. Co., 24800 Plymouth Rd., Detroit 39, Mich.

**AUTOMATIC SCREW MACHINES**—See Screw Machines, Single- and Multiple-Spindle Automatic**AUTOMATION EQUIPMENT**

Wilson Automation, P.O. Box 3855, Detroit 5, Mich.

**BABBITT**

Ryerson, Joseph T. & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.

**BALANCING EQUIPMENT**

Gisholt Machine Co. (Static and Dynamic), 1245 E. Washington Ave., Madison 10, Wis.  
LaSalle Tool, Inc., 3840 E. Outer Dr., Detroit 34, Mich.  
Orban Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Sundstrand Mach. Tool Co., 2531 11th St., Rockford, Ill.

**BALL-MAKING MACHINES**

New Departure Div., Bristol, Conn.

**BALLS**

Haynes Stellite Co., Kokomo, Ind.  
Kennametal Inc., Latrobe, Penna.

**BAR MACHINES**—See Screw Machines, Single- and Multiple-Spindle, Automatic**BAR STOCK, Non-ferrous**

American Crucible Prod. Co., Port Huron, Mich.  
Bunting Brass & Bronze Co., 715 Spencer, Toledo, Ohio  
Centrifugally Cast Products Div., Shenango Furnace Co., Dover, Ohio  
Mueller Brass Co., Port Huron, Mich.  
Ryerson, Joseph T. & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.

**BAR STOCK AND SHAFTING, Steel**

Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
Boston Gear Works, 14 Hayward St., Quincy 71, Mass.  
Carpenter Steel Co., 105 W. Bern St., Reading, Pa.  
Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 22, Pa.  
Cumberland Steel Co., Cumberland, Md.  
Ryerson, Joseph T. & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.

**BEARING PILLOW BLOCKS AND CARTRIDGES**

Fafnir Bearing Co., New Britain, Conn.

**BEARINGS, Ball**

Ball & Roller Bearing Co., Danbury, Conn.  
Boston Gear Works, 3200 Main St., North Quincy, Mass.  
Fafnir Bearing Co., New Britain, Conn.  
Marlin-Rockwell Corp., 402 Chandler Bldg., Jamestown, N. Y.  
New Departure Div., Bristol, Conn.  
Nice Ball Bearing Co., 30th & Hunting Park Ave., Philadelphia, Pa.  
Norma-Hoffman Bearings Corp., Stamford, Conn.

**BEARINGS, Bronze and Special Alloy**

Boston Gear Works, 3200 Main St., North Quincy, Mass.  
Bunting Brass & Bronze Co., 715 Spencer, Toledo, Ohio  
Centrifugally Cast Products Div., Shenango Furnace Co., Dover, Ohio  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.

**BEARINGS, Needle**

Orange Roller Bearing Co., Inc., Orange, N. J.

**BEARINGS, Oilless**

Bunting Brass & Bronze Co., 715 Spencer, Toledo 1, Ohio  
Ryerson, Joseph T. & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.

**BEARINGS, Roller**

Ball & Roller Bearing Co., Danbury, Conn.  
Marlin-Rockwell Corp., 402 Chandler Bldg., Jamestown, N. Y.  
Norma-Hoffman Bearings Corp., Stamford, Conn.  
Orange Roller Bearing Co., Inc., Orange, N. J.  
Rollway Bearings Co., Inc., 541 Seymour St., Syracuse, N. Y.  
Timken Roller Bearing Co., Canton, Ohio

**BEARINGS, Thrust**

Ball & Roller Bearing Co., Danbury, Conn.  
Bunting Brass & Bronze Co., 715 Spencer, Toledo, Ohio  
Centrifugally Cast Products Div., Shenango Furnace Co., Dover, Ohio  
Fafnir Bearing Co., New Britain, Conn.  
General Electric Co., Schenectady, N. Y.  
Marlin-Rockwell Corp., 402 Chandler Bldg., Jamestown, N. Y.  
Nice Ball Bearing Co., Nicetown, Philadelphia, Pa.  
Norma-Hoffman Bearings Corp., Stamford, Conn.  
Orange Roller Bearing Co., Inc., Orange, N. J.  
Rollway Bearing Co., Inc., Syracuse, N. Y.  
Timken Roller Bearing Co., Canton, Ohio

**BELT SANDERS**—See Grinding Machines, Abrasive Belt**BENCH CENTERS**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
Sundstrand Mch. Tool Co., 2531—11th St., Rockford, Ill.

**BENCHES AND STOOLS**

South Bend Lathe Works, South Bend 22, Ind.

**BENDERS, Bar, Tube, Channel, etc.**

Bath, Cyril Co., 32324 Aurora Road, Solon, Ohio  
Greenlee Bros. & Co., 2136—12th St., Rockford, Ill.  
Wallace Supplies Mfg. Co., 1308 Diversey Parkway, Chicago 14, Ill.

**BENDERS, Plate, Etc.**

Bath, Cyril Co., 32324 Aurora Road, Solon, Ohio.  
Cincinnati Shaper Co., Hopple & Gerrard, Cincinnati, Ohio.  
Dreis & Krump Mfg. Co., 7412 S. Loomis Blvd., Chicago 36, Ill.  
Niagara Mch. & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
Wallace Supplies Mfg. Co., 1308 Diversey Parkway, Chicago 14, Ill.

**BENDING MACHINES, Hydraulic**

Baldwin-Lima-Hamilton Corp., Eddystone Div., Philadelphia 42, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Hannifin Corp., 501 Wolf Rd., Des Plaines, Ill.  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.  
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.  
Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Verson Allsteel Press Co., 93rd St. & S. Kenwood Ave., Chicago, Ill.  
Wallace Supplies Mfg. Co., 1308 Diversey Parkway, Chicago 14, Ill.  
Watson-Stillman Co., Roselle, N. J.

**BENDING MACHINES, Pipe**

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Wallace Supplies Mfg. Co., 1308 Diversey Parkway, Chicago 14, Ill.  
Watson-Stillman Co., Roselle, N. J.

**BENDING ROLLS**

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland, Ohio.  
Niagara Mch. & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
Wallace Supplies Mfg. Co., 1308 Diversey Parkway, Chicago 14, Ill.

**BLAST CLEANING EQUIPMENT**

Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 38, Mich.  
Pangborn Corp., Hagerstown, Md.

**BLOWERS**

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.

**BLUING LAYOUT**

Dykem Co., 2307 N. 11th St., St. Louis 6, Mo.

**BOLTS, NUTS AND SCREWS**

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn.  
Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Ottemiller, W. H., & Co., York, Pa.  
Parker-Kalon Div., Clifton, N. J.  
Russell Burdett & Ward Bolt & Nut Co., Port Chester, N. Y.  
Standard Pressed Steel Co., Jenkintown, Pa.  
Williams & Co., J. H., 400 Vulcan St., Buffalo 7, N. Y.

**BOOKS, Technical**

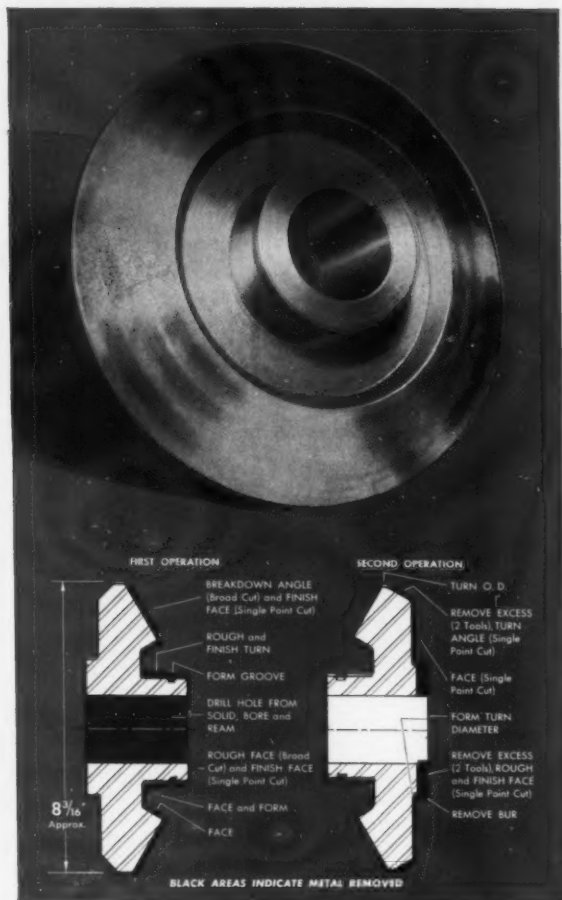
Industrial Press, 93 Worth St., New York 13, N. Y.

**BORING BARS**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Bullard Co., 286 Canfield Ave., Bridgeport 6, Conn.  
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
Ingersoll Milling Machine Co., 2442 Douglas St., Rockford, Ill.  
Kennametal Inc., Latrobe, Penna.  
Lovejoy Tool Co., Inc., Springfield, Vt.  
Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.

(Continued on page 286)





Let me show you  
how one of our  
P & J Automatics



put this

## "PROBLEM" Job on a PAYING BASIS!

Some of the toughest machining jobs you'll ever have to handle get that way, *not* because of any *single* factor like extra-hard metal or really heavy cutting, but because of *several* contributing factors that can add up to a lot of machining time and a big profit loss. The job shown here . . . which one of our customers brought in recently . . . is a good example. A glance at the "Job Facts" will show you a combination of factors that could easily have made this job a real problem. The most difficult of these requirements was machining the bevels . . . which had to meet close tolerances for size and conformity to the true angle and, in addition, demanded a fine finish with *no* tool-return marks permitted. However, handling this part on a Potter & Johnston 4-U Automatic, with a tooling set-up engineered by P&J Tooling Specialists, put this potential headache on a high-output, high-profit basis.

A new P&J Automatic can put *your* problem jobs on a paying basis too! Send me your sample prints and I'll show you how a P&J Automatic with P&J Tooling can help you turn

### HERE ARE THE JOB FACTS:

**PART:** Bevel Gear

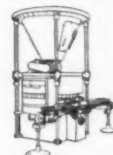
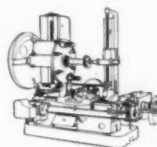
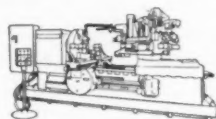
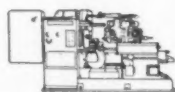
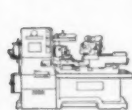
**MATERIAL:** Steel Forging, 190 Brinell

**MACHINING REQUIRED:** 22 separate roughing and finishing cuts including several hard-to-handle angle cuts.

**SPECIAL REQUIREMENTS:** Hold bevel angles to close tolerances and produce a good finish.

**RESULTS:** A part finished every 13 minutes floor-to-floor time . . . on a P&J 4-U Automatic!

out your toughest jobs faster, better and at lower cost. Write Potter & Johnston Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . GILDA PACKAGING MACHINES



# POTTER & JOHNSTON

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.  
PRECISION PRODUCTION TOOLING SINCE 1898

Scully-Jones & Co., 1906 Rockwell St., Chicago 8, Ill.  
 Universal Engineering Co., Frankenmuth 2, Mich.  
 Van Norman Mch. Co., 3640 Main St., Springfield 7, Mass.  
 Warner & Swasey, 5701 Carnegie Ave., Cleveland 3, Ohio.  
 Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, Mich.  
 Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### BORING HEADS

American Schiess Corp., 1232 Penn Ave., Pittsburgh 22, Pa.  
 Bridgeport Machines, Inc., 500 Lindley St., Bridgeport 6, Conn.  
 Bryant Chucking Grinder Co., Clinton St., Springfield, Vt.  
 Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
 Homestrand, Inc., Larchmont, N. Y.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Lovejoy Tool Co., Inc., Springfield, Vt.  
 Mummert-Dixon Co., Hanover, Pa.  
 Standard Electrical Tool Co., 2500 River Rd., Cincinnati 4, Ohio.  
 Universal Engineering Co., Frankenmuth 2, Mich.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

#### BORING MACHINES

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
 Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio.  
 Bullard Co., Bridgeport 6, Conn.  
 Canton Tool Mfg. Co., E. Canton, Ohio.  
 Consolidated Mch. Tool Div., 565 Blossom Rd., Rochester 10, N. Y.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Cross Co., 3250 Bellevue, Detroit 7, Mich.  
 Davis & Thompson Co., 4460 N. 24th St., Milwaukee 10, Wis.  
 DeVlieg Machine Co., Ferndale, Mich.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 G & L and Hypro Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Gray Co., G. A. 3611 Woodburn Ave., Cincinnati 7, Ohio.  
 Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
 Homestrand, Inc., Larchmont, N. Y.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co., Kaukauna, Wis.  
 Kearney & Trecker Corp., Milwaukee, Wis.  
 La Salle Tool, Inc., 3840 E. Outer Drive, Detroit 34, Mich.  
 Moline Tool Co., Moline, Ill.  
 National Automatic Tool Co., Inc., S. 7th and N. Sts., Richmond, Ind.  
 New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
 Olofsson Corp., Lansing, Mich.  
 Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
 Pope Machinery Co., Haverhill, Mass.  
 Sheffield Corp., Box 893, Dayton 1, Ohio.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette St., Detroit 9, Mich.  
 Wadell Equipment Co., Clark, N. J.  
 Wales-Strippit Co., Akron, N. Y.

#### BORING MILLS, Horizontal

American Schiess Corp., 1232 Penn Ave., Pittsburgh 22, Pa.  
 Bullard Co., Bridgeport 6, Conn.  
 Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio.  
 Consolidated Mch. Tool Div., 565 Blossom Rd., Rochester 10, N. Y.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.  
 G & L and Hypro Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Gray, G. A. Co., 3611 Woodburn Ave., Cincinnati 7, Ohio.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Innocenti, Milan, Italy.  
 Lucas Mch. Tool Div., New Britain Mch. Co., 12302 Kirby Ave., Cleveland 8, Ohio.  
 Morey Machine Co., 383 Lafayette St., New York 3, N. Y.  
 New Britain Mch. Co., New Britain, Conn.  
 Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
 Portage Machine Co., 1025 Sweitzer Ave., Akron 11, Ohio.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.

#### BORING MILLS, Vertical

American Schiess Corp., 1232 Penn Ave., Pittsburgh 22, Pa.  
 Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio.  
 Bullard Co., 286 Canfield Ave., Bridgeport 6, Conn.  
 Consolidated Mch. Tool Div., 565 Blossom Rd., Rochester 10, N. Y.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 G & L and Hypro Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co., Kaukauna, Wis.  
 King Machine Tool Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio.  
 New Britain Mch. Co., New Britain, Conn.  
 Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
 Portage Mch. Co., 1025 Sweitzer Ave., Akron 11, Ohio.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.

#### BORING TOOLS

American Schiess Corp., 1232 Penn Ave., Pittsburgh 22, Pa.  
 Apex Tool & Cutter Co., Inc., 285 Canal St., Shelton, Conn.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 Bullard Co., 286 Canfield Ave., Bridgeport 6, Conn.  
 Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 2, Pa.  
 Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Kennametal Inc., Latrobe, Penna.  
 Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
 Portage Machine Co., 1025 Sweitzer Ave., Akron 11, Ohio.  
 Pratt & Whitney Co., Inc., West Hartford, Conn.  
 Scully-Jones & Co., 1906 Rockwell St., Chicago 8, Ill.  
 Vascology-Ramet Corp., Waukegan, Ill.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### BRAKES, Press and Bending

Bath, Cyril Co., 32324 Aurora Road, Solon, Ohio.  
 Cincinnati Shaper Co., Hopple & Gerrard, Cincinnati, Ohio.  
 Cleveland Crane & Engrg. Co., Wickliffe, Ohio.  
 Dreis & Krump Mfg. Co., 7412 S. Loomis Blvd., Chicago 36, Ill.  
 Ferracute Machine Co., Bridgeport, N. J.  
 Lodge & Shipley Co., Hamilton 1, Ohio.  
 Niagara Mch. & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, Ill.  
 Watson-Stillman Co., Roselle, N. J.

#### BRASS

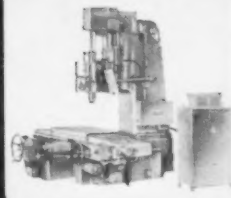
American Brass Co., 25 Broadway, New York, N. Y.  
 Bridgeport Brass Co., Bridgeport, Conn.  
 Mueller Brass Co., Port Huron 35, Mich.  
 Revere Copper & Brass, Inc., 230 Park Ave., New York, N. Y.

#### BROACHES

American Broach & Mch. Co., Ann Arbor, Mich.  
 Colonial Broach & Machine Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
 Detroit Broach Co., Inc., 950 S. Rochester Rd., Rochester, Mich.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Lapointe Mch. Tl. Co., Tower St., Hudson, Mass.  
 Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
 National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
 Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
 Sundstrand Mch. Tool Co., 2531-11th St., Rockford, Ill.  
 Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

*Because*  
**"SEEING IS BELIEVING"**  
*let this film show you how*

### THE PRATT & WHITNEY Electrolimit JIG BORER



- INCREASES ACCURACY
- HELPS ELIMINATE COSTLY ERRORS
- IMPROVES WORK QUALITY

*And*

- REDUCES PRODUCTION COSTS IN THE TOOLROOM AND ON THE PRODUCTION LINE!

*Arrange Now . . .*

for a showing of the new 16 mm sound motion picture film in full color.

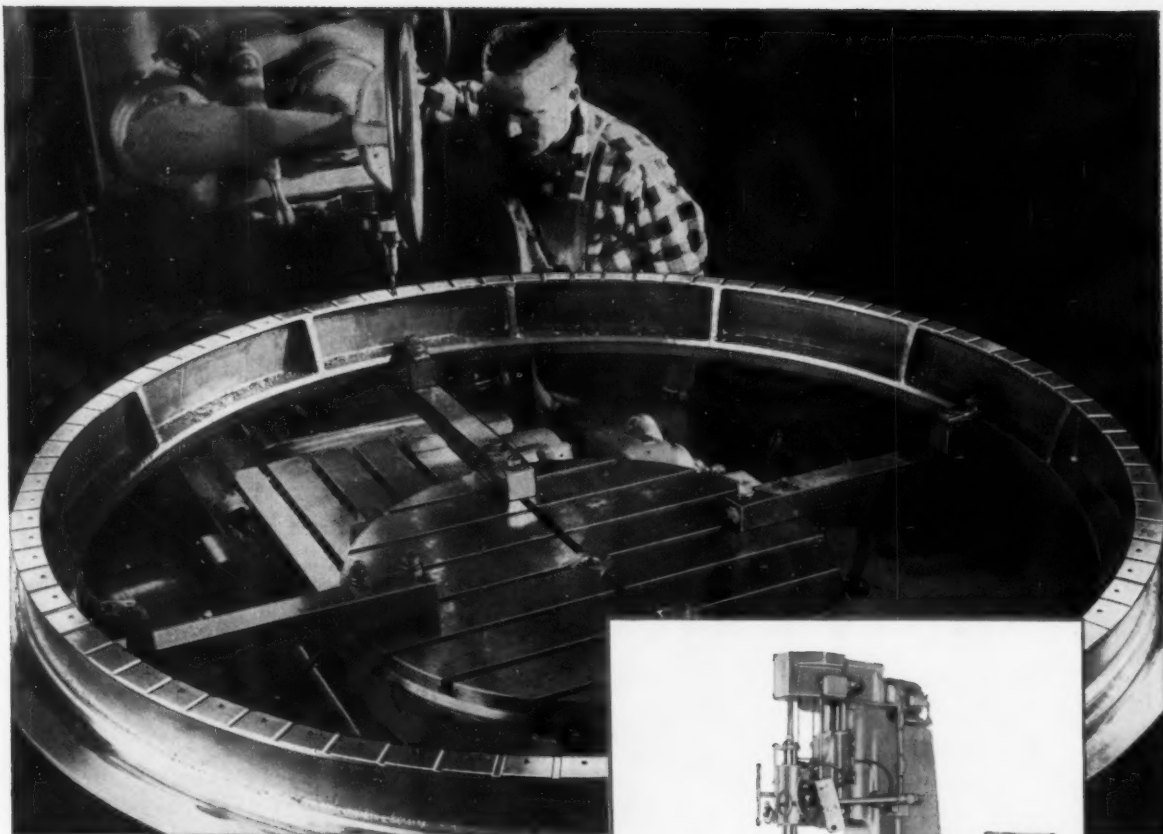
**"ACCENT ON ACCURACY"**

*Write* on your company letterhead to Pratt & Whitney Company, Inc., 12 Charter Oak Blvd., West Hartford 1, Conn.

**PRATT & WHITNEY**  
 FIRST CHOICE FOR ACCURACY



MACHINE TOOLS • GAGES  
 CUTTING TOOLS

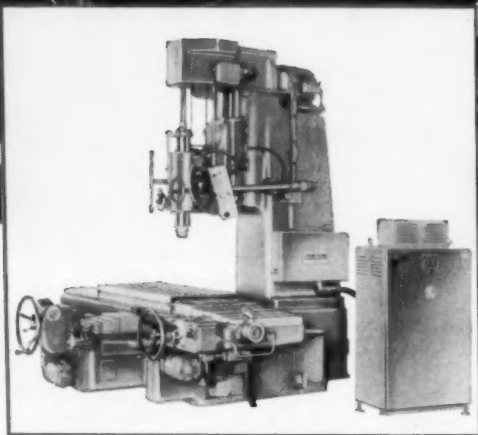


## **PRECISION** ***plus* BIG CAPACITY**

### **P&W JIG BORERS WITH OPEN-SIDE CONSTRUCTION**

Nearly 6 feet in diameter, the aircraft tooling fixture shown above was really big! It required machining 84 slots and boring 84 holes on the face and machining 84 slots on the flange. All 252 slots and holes had to be equally spaced and located within  $\pm .001"$  of true radial. Handling jobs like this with ease and efficiency takes the combination of high precision and big work capacity you'll find only in a Pratt & Whitney Jig Borer with Open-Side Construction.

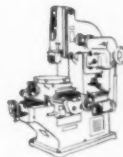
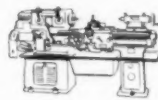
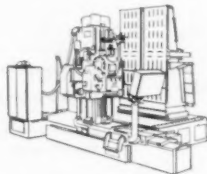
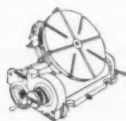
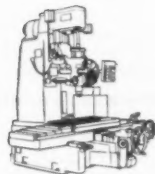
Pratt & Whitney Jig Borers — both Electrolimit and



End-Measure types — are produced in complete lines for every work size requirement. All types and models will locate accurate to  $.0001"$  . . . and will retain this initial high precision and rigidity indefinitely! Get complete information now.

Write for your copy of Circular No. 587.

Pratt & Whitney Company, Incorporated,  
12 Charter Oak Boulevard, West Hartford 1,  
Connecticut.



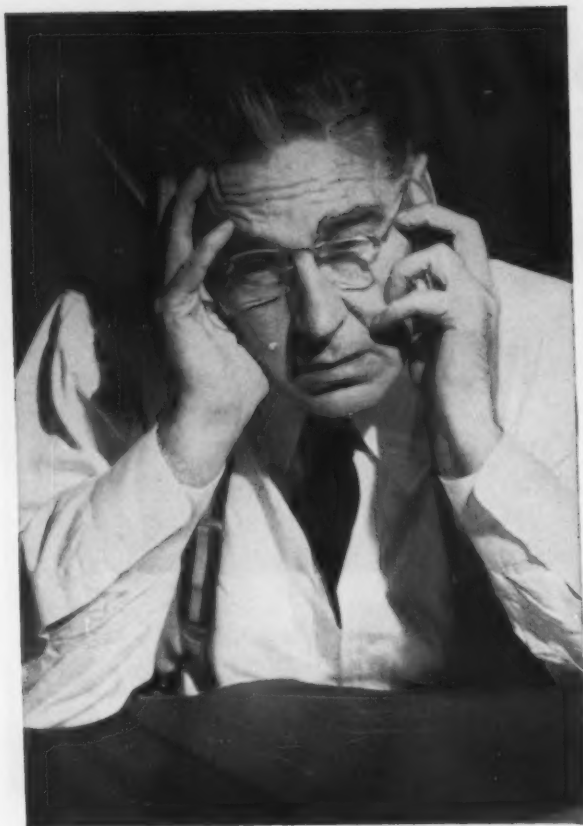
JIG BORERS . . . ROTARY TABLES . . . KELLER MACHINES . . . LATHES . . . VERTICAL SHAPERS . . . CUTTER AND RADIUS GRINDERS



# **PRATT & WHITNEY**

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS



send it  
out to

**CDT**

There is no faster, more reliable way to get help with difficult tooling problems than to send it to Columbus Die-Tool. Backed by 50 years of experience, CDT has three basic objectives when designing and building tools, jigs, fixtures or special machinery.

1. Increase Production
2. Improve Quality of Product
3. Lower Production Costs

These and other benefits are reasons why so many of the nation's leading manufacturers regularly avail themselves of the specialized services of Columbus Die-Tool. Perhaps we can solve your tooling problem and help you make your product . . . better, for less.

**Columbus Die-Tool**  
AND MACHINE COMPANY

P. O. BOX 750 • COLUMBUS, OHIO  
ESTABLISHED 1906

Designers and manufacturers of JIGS • FIXTURES • SPECIAL TOOLS •  
UNITS FOR MACHINE TOOLS • also Builders of Machine Tools Complete

288—MACHINERY, November, 1957

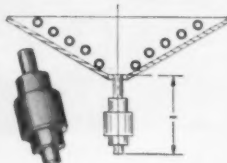
**Lepel**  
HIGH FREQUENCY  
INDUCTION  
HEATING  
UNITS

The Lepel line of induction heating equipment represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating.

If you are interested in induction heating you are invited to send samples of the work with specifications. Our engineers will process and return the completed job with full data and recommendations without any cost or obligations.

### TYPICAL INDUCTION HEATING APPLICATIONS

#### TEMPERING FOR CUSTOM HEAT TREATING



Selected areas of hardened steel parts may be tempered for fabrication or service requirements. Concentrator type coil permits high power density in restricted area thus minimizing heating time and permitting marked variation in properties in adjacent sections.

#### WIRE RING JOINS PLASTIC PARTS

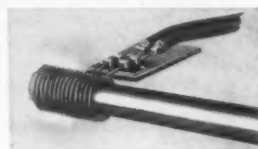
##### ENLARGED SECTION



.036 STEEL  
WIRE RING.

High frequency induction heats wire ring which in turn heats plastic wall, providing sufficient plasticity to cause flow and bonding upon application of pressure. Metal to plastic seals are similarly performed.

#### ANNEALING ALUMINUM FURNITURE TUBING



Selective annealing of aluminum furniture tubing permits bending where required without loss of strength in adjacent portions of tube. Brass or steel tubing is also being selectively annealed.

Electronic Tube Generators from 1 kw to 100 kw.  
Spark Gap Converters from 2 kw to 30 kw.

WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information.



All Lepel equipment is certified to comply with the requirements of the Federal Communications Commission.

**LEPEL HIGH FREQUENCY LABORATORIES, INC.**  
55th STREET and 37th AVENUE, WOODSIDE 77, NEW YORK CITY, N. Y.

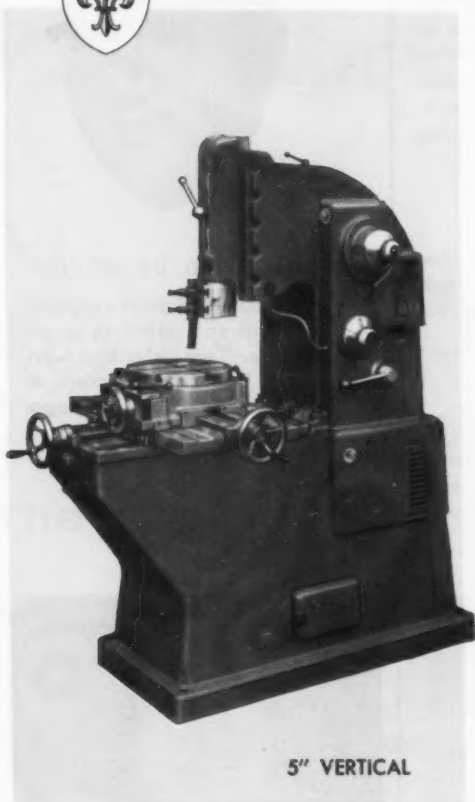


## HORIZONTAL AND VERTICAL

# SHAPERS

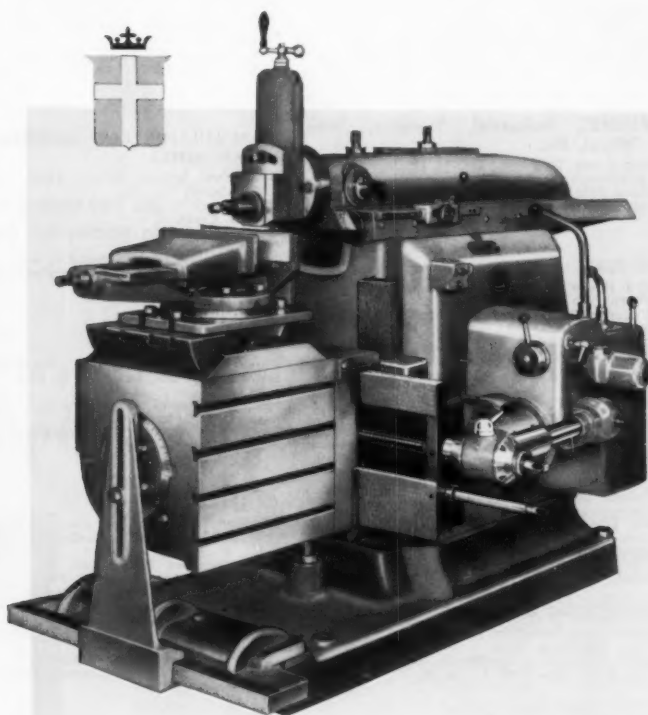
**BUILT TO U.S. STANDARDS BY  
EUROPE'S FINEST CRAFTSMEN**

The finest old world skills build life-long precision into these shapers assuring dependable production to the most exacting tolerances. Sound engineering standards and modern design are combined in these shapers offered at low initial cost.



5" VERTICAL

Chomienne Vertical Shaper—  
5" stroke, with 12½" rotary table, automatic  
lubrication, power feed. A real time-saver for  
accurate machining of irregular shapes and  
forms. Low initial cost.



ES-26 UNIVERSAL

VMA Shapers—standard and production models . . 14" to 28" stroke  
. . automatic lubrication, table power rapid traverse.

**@ustin** INDUSTRIAL CORPORATION  
76-E MAMARONECK AVENUE • WHITE PLAINS, NEW YORK

**HORIZONTAL AND VERTICAL MILLING MACHINES • POWER HACKSAWS**

FAST SERVICE AND PARTS AVAILABLE FROM MAJOR CITIES. WRITE FOR CATALOGS

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—289

**BROACHING MACHINE, Internal**

American Broach & Mch. Co., Ann Arbor, Mich.  
Colonial Broach & Machine Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
Detroit Broach Co., Rochester, Mich.  
Lapointe Mch. Tl. Co., Tower St., Hudson, Mass.  
Sundstrand Mch. Tool Co., 2531—11th St., Rockford, Ill.  
Wilson, K. R., Inc., 211 Mill St., Arcade, N. Y.

**BROACHING MACHINE, Surface**

American Broach & Mch. Co., Ann Arbor, Mich.  
Cincinnati Milling and Grinding Mchs., Inc., Cincinnati, Ohio.  
Colonial Broach & Machine Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
Detroit Broach Co., Rochester, Mich.  
Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8, Ohio.  
Lapointe Mch. Tl. Co., Tower St., Hudson, Mass.  
Sundstrand Mch. Tool Co., 2531—11th St., Rockford, Ill.

**BRONZE**

American Brass Co., Waterbury 20, Conn.  
Bridgeport Brass Co., Bridgeport, Conn.  
Mueller Brass Co., Port Huron 35, Mich.

**BRUSHES, Industrial, Tampico, Wire Wheel, Etc.**

Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.

**BUFFERS**

Delta Power Tool Div., 400 Lexington Ave., Pittsburgh 8, Pa.  
Pittsburgh Plate Glass Co., Brush Div., Baltimore 29, Md.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio.

**BULLDOZERS, Metalforming**

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio.  
Farquhar Div., A. B., 142 N. Duke St., York, Pa.  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
Watson-Stillman Co., Roselle, N. J.

**BURNISHING MACHINES**

Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.

**BURRING MACHINES—See Deburring Machines****BURRS—See Files and Burrs, Rotary****BUSHINGS, Drill Jig**

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Metrol Carbides Corp., 6001 Southern Blvd., Youngstown 12, Ohio.  
Universal Engrg. Co., Frankenmuth, Mich.

**BUSHINGS, Hardened Steel**

Universal Engrg. Co., Frankenmuth, Mich.

**BUSHINGS, Non-ferrous and Powdered Metal**

American Crucible Products Co., Lorain, Ohio.  
Bunting Brass & Bronze Co., 715 Spencer, Toledo, Ohio.  
Universal Engrg. Co., Frankenmuth, Mich.

**CABINETS, Tool**

Standard Pressed Steel Co., Jenkintown, Pa.

**CALIPERS, Spring, Firm-Joint, Transfer, Hermaphrodite, etc.—See Layout and Drafting Tools, Machinists' Small Tools****CALIPERS, Vernier**

Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., Des Plaines, Ill.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Starrett, The L. S. Co., Athol, Mass.

**CAM CUTTING MACHINES**

Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Russell Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
Sundstrand Mch. Tool Co., 2531—11th St., Rockford, Ill.  
Van Norman Mch. Co., 3640 Main St., Springfield 7, Mass.

**CAM MILLING AND GRINDING MACHINES**

American Schless Corp., 1232 Penn Ave., Pittsburgh 22, Pa.  
Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Cincinnati Milling Machine Co., Oakley, Cincinnati, Ohio.  
Landis Tool Co., Waynesboro, Pa.  
Rowbottom Machine Co., Waterbury, Conn.

**CAMS**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Eisler Engrg. Co., Inc., 750 S. 13th, Newark 3, N. J.  
Hartford Special Machinery Co., 287 Homestead St., Hartford, Conn.  
Rowbottom Machine Co., Waterbury, Conn.

**CARBIDES**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
DoAll Co., Des Plaines, Ill.  
Kennametal, Inc., Latrobe, Pa.  
Linde Co., 30 E. 42nd St., New York 17, N. Y.  
Metal Carbides Corp., Youngstown, Ohio.  
Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Vascoloy-Ramet Corp., Waukegan, Ill.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

**CASTINGS, Die**

American Brass Co., Waterbury 20, Conn.  
Madison-Kipp Corp., Madison, Wis.

**CASTINGS, Non-ferrous**

American Crucible Products Co., Lorain, Ohio.  
Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
Centrifugally Cast Products Div., Shenango Furnace Co., Dover, Ohio.  
Dow Chemical Co., Midland, Mich.  
Mueller Brass Co., Port Huron 35, Mich.  
Vascoloy-Ramet Corp., Waukegan, Ill.

**CASTINGS—Gray Iron, Malleable**

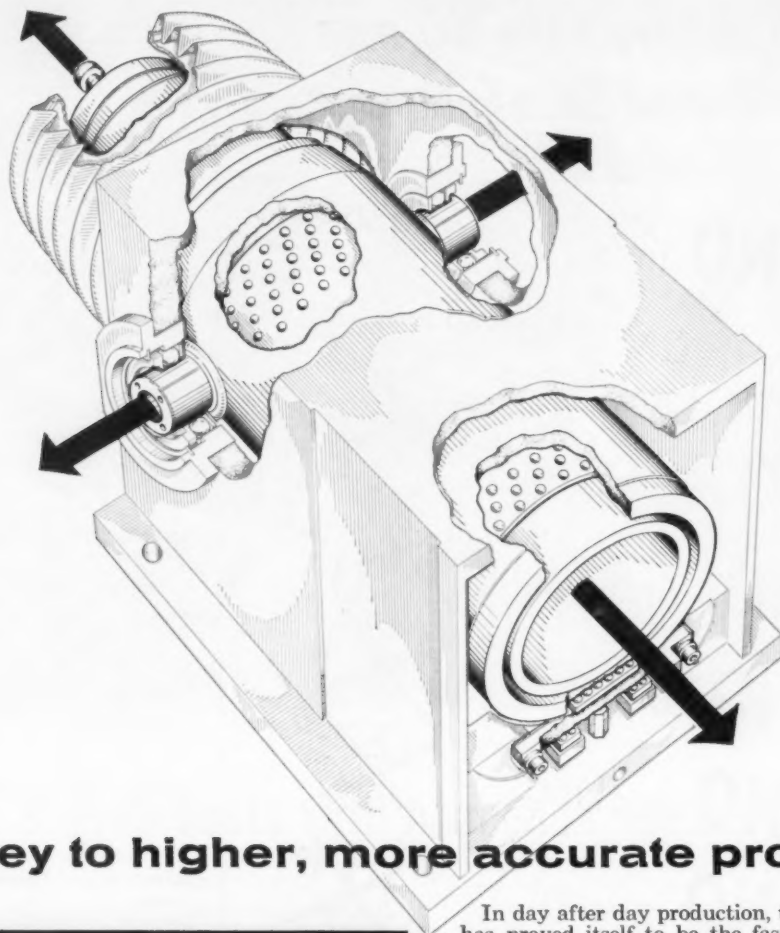
Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
Centrifugally Cast Products Div.—Shenango Furnace Co., Dover, Ohio.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co., Kaukauna, Wis.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

**The BRYANT****Meet T. D. DETHEROW**

... one of Bryant's experts on internal grinding of all types. Tom, who has been with Bryant for 17 years, is in charge of the Chicago territory.

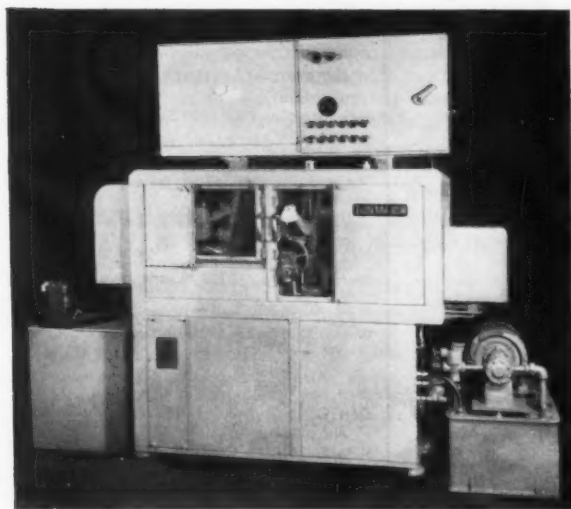


**CENTALIGN offers more than any other internal grinder!**



Exclusive anti-friction pre-loaded ball slide construction, incorporating both traverse and cross-feed motion.

## The Key to higher, more accurate production!



In day after day production, the Bryant Centalign\* has proved itself to be the fastest precision internal grinder ever built.

Compare the Centalign and its completely new design with any other internal grinder. Your analysis will show that only the Centalign offers these and other important features which result in higher production and increased accuracy:

- Wheelslide construction with grinding forces directly opposed on the same plane in which they are applied. Deflection caused by cantilevers is completely eliminated.
- Split-second cycle control by a simple cam unit which may be quickly adjusted when cycle changes are required. The complete unit may also be stored, and interchanged as a pre-set program.
- Simple servo-controlled hydraulic actuation of the wheelslide traverse. Power is applied directly on the center line of the wheelslide, avoiding objectionable side forces.

The Centalign is available in standard models for grinding straight bores, tapered bores or forms such as ball tracks. For high production contour bore grinding, custom-designed vertical Centaligns are available.

Write today for complete information.

\*T. M. Reg. U. S. Pat. Off., The Bryant Chucking Grinder Co.

# **BRYANT Chucking Grinder Co.**

20 CLINTON STREET, SPRINGFIELD, VERMONT

Offices: Indianapolis • Cleveland • Chicago • Detroit • Mt. Vernon, N. Y. • Philadelphia

Internal Grinders • Internal & External Thread Gages • Granite Surface Plates • Magnetic Drums for Computers • Special Machinery

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—291

## MESSAGE from the "NO" men of Laminated Shim Company

You lose **NO** time when you use  
LAMINUM SHIMS...

**NO** machining!

**NO** grinding!

**NO** counting!

**NO** stacking!

**NO** miking!

...and **NO** dirt between layers—ever!

LAMINATED SHIMS OF



Laminated Shims of  
**LAMINUM**  
now available in

Complete details in Engineering  
Data File. Send for free copy.

|   |  |
|---|--|
| STAINLESS<br>STEEL<br>with laminations<br>of .002" or .003" | ALUMINUM<br>with laminations<br>of .003" only                |
| BRASS<br>with laminations<br>of .002" or .003"              | LOW CARBON<br>STEEL<br>with laminations<br>of .002" or .003" |

**LAMINATED SHIM COMPANY, INC.**

Shim Headquarters since 1913  
3911 Union Street, Glenbrook, Conn.

### CASTINGS, Steel, Stainless, etc.

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., 701 East Third St.,  
Bethlehem, Pa.  
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.  
Crucible Steel Co. of America, Henry W.  
Oliver Bldg., Pittsburgh 22, Pa.

### CEMENT, Abrasive Disc

Delta Power Tool Div., 400 N. Lexington Ave.,  
Pittsburgh 8, Pa.  
Walls Sales Corp., 333 Nassau Ave., Brooklyn  
22, N. Y.

### CENTER-DRILLING MACHINES

Hartford Special Machinery Co., 287 Home-  
stead St., Hartford, Conn.  
La Salle Tool, Inc., 3840 E. Outer Drive, De-  
troit 34, Mich.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sundstrand Mch. Tool Co., 2531 11th St.,  
Rockford, Ill.

### CENTER PUNCHES — See Machinists' Small Tools

### CENTERS, Grinding Machines, Indexing Head and Lathe

Houston Grinding & Mfg. Co., Inc., Houston 8,  
Texas  
Metal Carbides Corp., Youngstown, Ohio.  
Metallurgical Products Dept. of General Elec-  
tric Co., Box 237, Roosevelt Park Annex,  
Detroit, Mich.  
Scully Jones & Co., 1906 Rockwell St., Chicago  
8, Ill.  
Wesson Co., 1220 Woodward Heights Blvd.,  
Ferndale, Mich.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

### CERAMIC TOOL MATERIAL—See Tool Material, Ceramic

### CHAINS, Power Transmission and Con- veyor

Boston Gear Works, 14 Hayward St., Quincy  
71, Mass.

### CHUCKING MACHINES, Multiple-Spindle Automatic

Baird Machine Co., 1700 Stratford Ave., Strat-  
ford, Conn.  
Bullard Co., 286 Canfield Ave., Bridgeport 6,  
Conn.  
Cone Automatic Mch. Co., Inc., Windsor, Vt.  
Cross Co., 3250 Bellevue Ave., Detroit 7,  
Mich.  
Goss & DeLeeuw Mch. Co., Kensington, Conn.  
National Acme Co., 170 E. 131st St., Clevel-  
and, Ohio.  
New Britain Mch. Co., New Britain-Gridley  
Mch. Div., New Britain, Conn.  
Olofson Corp., 2729 Lyons Ave., Lansing,  
Mich.  
Pratt & Whitney Co., Inc., West Hartford,  
Conn.  
Warner & Swasey, 5701 Carnegie Ave., Clevel-  
and 3, Ohio.

### CHUCKING MACHINES, Single-Spindle Automatic

Bullard Co., 286 Canfield Ave., Bridgeport 6,  
Conn.  
Cleveland Automatic Machine Co., 4932 Beech  
St., Cincinnati 12, Ohio.  
Coulter, James, Machine Co., 629 Railroad  
Ave., Bridgeport 5, Conn.  
Gisholt Machine Co., 1245 E. Washington  
Ave., Madison 10, Wis.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Morey Machine Co., 383 Lafayette St.,  
New York 3, N. Y.  
National Acme Co., 170 E. 131st St., Clevel-  
and, Ohio.  
Potter and Johnston Co., 1027 Newport Ave.,  
Pawtucket, R. I.  
Russell Holbrook & Henderson, Inc., 292 Madi-  
son Ave., New York 17, N. Y.

(Continued on page 294)





Handles for the gold-plated (left) and standard "Heavy" (center) Gillette safety razors are made from Anaconda leaded commercial bronze special-shape seamless tube, .4525" O.D., .371" I.D. "Regular" model (right) is of commercial bronze .395" O.D., .324" I.D.

## Gillette shaves costs with Anaconda special-shape tubes

**The problem:** The Gillette Safety Razor Company, Boston, Mass., formerly used drawn shells for the handles of its famous line of razors. Press-fit assembly of components called for very close tolerances and suppliers of the drawn shell had difficulty in controlling the dimensions to the accuracy required. Rejects and production delays were becoming a costly problem to Gillette, and there was also excessive waste of material in trimming the shells after the knurling, grooving and rolling operations.

**The solution:** American Brass Company representatives suggested the use of special-shape (fluted) tubes to meet the tolerances required—in alloys suitable for the machining operations. Gillette tried the idea and now uses Anaconda special-shape tubes for handles of three models.

Long lengths of the tube are fed into high-speed, multiple-spindle machines which automatically convert the tube to razor handles ready for the plating room. Production is greatly increased, rejects and waste material are reduced to a minimum, and the uniformity of the handles simplifies assembly. Most important of all to the Gillette Safety Razor Company is the improved quality of the finished product.

**Save Material and Production Costs:** Special-shape seamless tubes—of copper, copper alloys or aluminum—in standard lengths, or cut to specified lengths, can save several steps in arriving at a finished product. The American Brass Company's French Small Tube Division are specialists in producing small tubes (up to  $\frac{3}{4}$ " O.D.) of special design and, in addition to maintaining a wide range of stock dies, are ready to cooperate fully in the development of new shapes to meet specific requirements.

**For Action:** Contact our nearest District Sales Office or send a sample, drawing or description, estimated quantity, kind of metal required and other pertinent data to: The American Brass Company, French Small Tube Division, Waterbury 20, Conn.

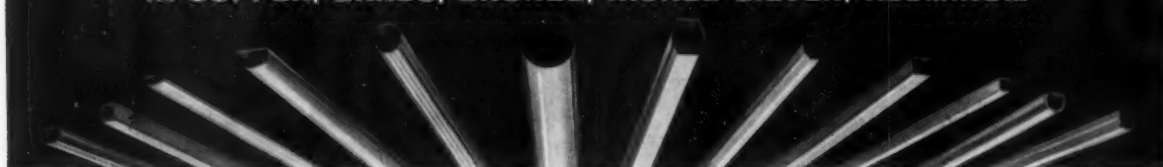
8772

# ANACONDA<sup>®</sup>

## SPECIAL-SHAPE TUBES

Made by The American Brass Company

**SPECIAL-SHAPE TUBES IN LONG LENGTHS OR CUT UP—  
IN COPPER, BRASS, BRONZE, NICKEL SILVER, ALUMINUM**



# RUGGED

## 100 TON CAPACITY



Model No. 37K-MD-3

**BUILT TO HANDLE LARGER, HEAVIER WORK AT HIGHER TONNAGES WITH EASE**

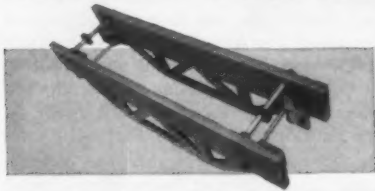


Photo above indicates the heavy construction of bed plates—reinforced to provide maximum rigidity and minimum deflection.

### SPECIFICATIONS

|                       |                        |
|-----------------------|------------------------|
| Ram Speeds — in./min. | 18                     |
| Cylinder Bore — in.   | 7                      |
| Ram Stroke — in.      | 12                     |
| Daylight — in./max.   | 42 1/4                 |
| Opening, L-R — in.    | 45 1/2                 |
| Between Bed Plates    | 11 1/8                 |
| Motor, H.P.           | 7 1/2 / 220 / 440-3-60 |
| Shipping Wt. — lbs.   | 3025                   |

### STANDARD EQUIPMENT

1 pair notched V blocks; 1 pressure gauge, dual range P.S.I. and tons on ram; 1 bed adjusting mechanism; 1 flat ram nose; 1 auxiliary 2-speed hand-pump.

You won't have to baby this husky K. R. Wilson hydraulic shop press. Built to tackle the toughest jobs, it's the most rugged standard press of its type available. Heavy-duty, spring-return ram type hydraulic cylinder has a larger bore and longer stroke. This allows the press to handle the big jobs swiftly and safely with a minimum of bed plate adjusting. You get tremendous versatility too! The large, usable daylight opening between side members allows straightening of long pieces. Pressing bushings, shafts, wheels on and off, broaching, bending, coining, forming and drawing operations all can be handled with equal speed and ease. K. R. Wilson Motor Operated Hydraulic Shop Presses are also available in 30, 50 and 75 Ton Capacity. Get all the facts now on these rugged presses!

Get Full Details. Write for Bulletin No. 19

### HYDRAULICS DIVISION

## K. R. WILSON, Inc.

Offices & Factories — 212 Main St., Arcade, N. Y., U.S.A.



Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sundstrand Mch. Tool Co., 2531 11th St.,  
Rockford, Ill.  
Warner & Swasey Co., 5701 Carnegie Ave.,  
Cleveland 83, Ohio.

### CHUCKS, Air Operated

Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Cushman Chuck Co., Windsor Ave., Hartford 2, Conn.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.  
Schroder's Son, A., 470 Vanderbilt Avenue, Brooklyn, N. Y.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.

### CHUCKS, Collet

Bryant Chucking Grinder Co., Clinton St., Springfield, Vt.  
Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio.  
Cushman Chuck Co., 800 Windsor St., Hartford 2, Conn.  
Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
Errington Mech. Lab. Inc., 24 Norwood Ave., Staten Island 4, N. Y.  
Gisholt Mch. Co., 1245 E. Washington Ave., Madison 10, Wis.  
Gorton Mch. Co., Geo., 1321 Racine St., Racine, Wis.  
Hardinge Bros., Inc., 1420 College Ave., Elmira, N. Y.  
Jacobs Mfg. Co., West Hartford 10, Conn.  
Kearney & Trecker Corp., Milwaukee 14, Wis.  
National Acme Co., 170 E. 131st St., Cleveland 8, Ohio.  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Universal Engrg. Co., Frankenmuth 2, Mich.  
Warner & Swasey, 5701 Carnegie Ave., Cleveland 3, Ohio.

### CHUCKS, Combination Universal-Independent

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.  
Gisholt Mch. Co., Madison 10, Wis.  
Horton Chuck, Windsor Locks, Conn.  
Kearney & Trecker Corp., Milwaukee 14, Wis.  
National Acme Co., 170 E. 131st St., Cleveland 8, Ohio.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.

### CHUCKS, Compensating

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.  
Logansport Mch. Co., Inc., Logansport, Ind.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.

### CHUCKS, Diaphragm

Bryant Chucking Grinder Co., Clinton St., Springfield, Vt.  
Wadell Equip. Co., Terminal Ave., Clark, N. J.

### CHUCKS, Drill, Key Type

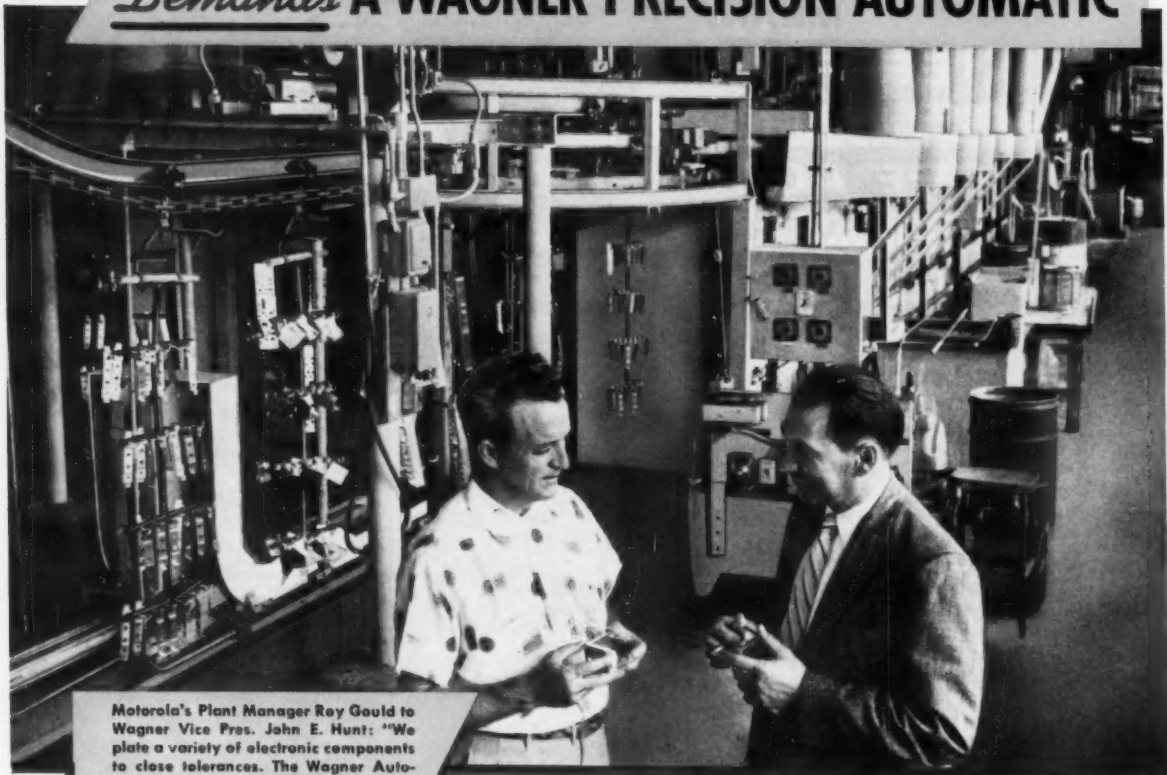
Delta Power Tool Div., 400 Lexington Ave., Pittsburgh 8, Pa.  
Jacobs Mfg. Co., West Hartford, Conn.

### CHUCKS, Drill, Keyless

Delta Power Tool Div., 400 Lexington Ave., Pittsburgh 8, Pa.  
Jacobs Mfg. Co., West Hartford, Conn.  
Scully-Jones & Co., 1906 Rockwell St., Chicago 8, Ill.

# MOTOROLA'S PRECISION PLATING

## *Demands* A WAGNER PRECISION AUTOMATIC



Motorola's Plant Manager Roy Gould to Wagner Vice Pres. John E. Hunt: "We plate a variety of electronic components to close tolerances. The Wagner Automatic gives us the control we need."

Television and other electronic components are cadmium plated to specifications much more rigid than most military parts. That's why Motorola, Inc., after an intensive study of all makes of automatic plating machines in the plants of its suppliers and many other manufacturers, specified a Wagner Automatic for their critical work, a deposit of  $.0003'' + .000075'' - 0''$ . This precision plating machine, designed to solve Motorola's problems but using many standard components, now produces 95% of the requirements of the Communication and Industrial Electronics Division, proof of the versatility of Wagner design and engineering.

Plant Manager Roy Gould says, "Only the Wagner Automatic offers all the features desired, in addition to the greatest output per

hour of the quality plating we demand. We like the smoothness of lift and transfer, the absence of impact, the elimination of a tremendous superstructure, and the foolproof hydraulic system. The simplicity of design and the standardization of parts and assemblies enable our mechanics to handle all adjustments and maintenance. The installation was fast—and the Wagner men performed their company's contractual and unspoken obligations competently and without hesitation. Since the first week or two of running, only minor adjustments have been needed."

Remember, only Wagner manufactures the equipment and processes the chemicals required by your plant. For information on Wagner automatic plating machines and materials handling engineering services, write today or call our representative in your area.

MANUFACTURERS AND PROCESSORS OF ALL METAL-FINISHING CHEMICALS, ANODES, AND EQUIPMENT

**400 MIDLAND AVE., DETROIT 3, MICHIGAN**  
CHICAGO • CINCINNATI • CLEVELAND • INDIANAPOLIS • NEW YORK • ROCHESTER • GRAND RAPIDS

**Wagner**  
BROTHERS INC.

# TOWNSEND of HARTFORD

## MACHINING METHODS

### MEAN

## GREATER PRODUCTIVITY

### AND

## MORE ACCURACY

### WITH

## LESS MANPOWER

Townsend's integration of **FOUR** major automatic machine manufacturers into **ONE**, has brought benefits to our customers virtually impossible heretofore without making a big capital investment. The Townsend Line of Qualimatic Machines performs a *full range* of machining operations which means *greater productivity* at *reduced costs—specific savings in manpower*—and *greater accuracy... all* at a minimum capital investment.

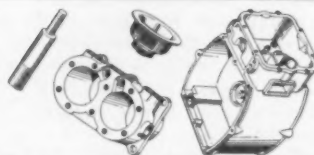
*Send your machining and production problems to Townsend of Hartford. Our engineering department can help you achieve the answers. No obligation!*



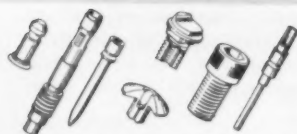
**COCHRANE-BLY:** Metal Sawing Machines for **CUTTING** ferrous and non-ferrous materials in regular or irregular shapes up to 20" in diameter.



**TAYLOR and FENN, Machine Division:** Machines for **MILLING** a full variety of straight and spiral keyways.



**THE CLEVELAND TAPPING MACHINE CO.:** Standard and Special Machines for **drilling and TAPPING . . .** incorporating rotary index tables.



**THE TOWNSEND MFG. CO.:** Hopper Fed Secondary Operation Machines for **TURNING**, drilling, pointing, grooving of headed blanks.

**The H. P. TOWNSEND MANUFACTURING CO.**

BROOK ST., WEST HARTFORD 10, CONNECTICUT



#### CHUCKS, Full Floating

Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.  
Gisholt Mch. Co., Madison 10, Wis.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Universal Engineering Co., Frankenmuth 2, Mich.

#### CHUCKS, Gear

Bryant Chucking Grinder Co., Clinton St., Springfield, Vt.  
Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.  
Horton Chuck, Windsor Locks, Conn.  
Le Maire Tool & Mfg. Co., Dearborn, Mich.

#### CHUCKS, Independent

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.  
Gisholt Mch. Co., Madison 10, Wis.  
Homstrand, Inc., Larchmont, N. Y.  
Horton Chuck, Windsor Locks, Conn.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.

#### CHUCKS, Lathes, etc.

Axelsson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Bullard Co., Brewster St., Bridgeport 2 Conn.  
Cushman Chuck Co., Windsor Ave., Hartford 2, Conn.  
Gisholt Mch. Co., Madison 10, Wis.  
Horton Chuck, Windsor Locks, Conn.  
Jacobs Mfg. Co., West Hartford, Conn.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

#### CHUCKS, Magnetic

Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Hanchett Magna-Lock Corp., Big Rapids, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
Walker, O. S., Inc., Worcester, Mass.

#### CHUCKS, Power Operated

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.  
Gisholt Mch. Co., Madison 10, Wis.  
Logansport Mch. Co., Inc., Logansport, Ind.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.

#### CHUCKS, Quick Change and Safety

Jacobs Mfg. Co., West Hartford 10, Conn.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Scully-Jones & Co., 1906 Rockwell St., Chicago 8, Ill.  
Universal Engineering Co., Frankenmuth 2, Mich.

#### CHUCKS, Ring Wheel

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.  
Gardner Mch. Co., 414 E. Gardner St., Beloit, Wis.

#### CHUCKS, Tapping

DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.  
Jacobs Mfg. Co., West Hartford, Conn.



# Cutting Aluminum Extrusions?

Here's  
the  
**SAW!**



**SEND FOR CATALOG O**

Specially designed for cutting aluminum extrusions, this saw is proving exceptionally efficient. Ask Circle R representatives about its performance and for our know-how in cutting this important metal . . . we'll be glad to tell you!

**Burbank  
Chicago  
Cleveland  
Dayton  
Detroit**

**Hackensack  
Indianapolis  
Kansas City  
Milwaukee**

**New York City  
Philadelphia  
Montreal  
Phoenix**

**Pittsburgh  
Providence  
Rochester  
St. Louis  
Westbury, L. I.**

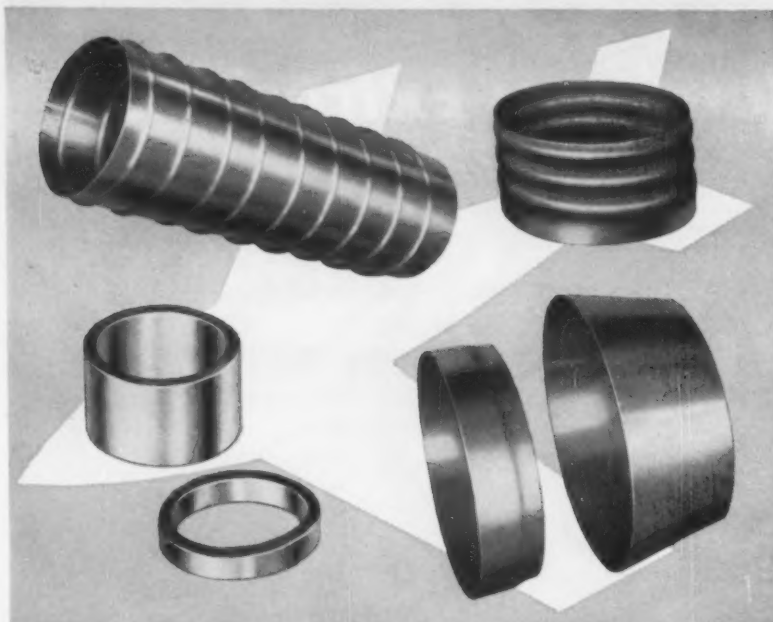
METAL SLITTING SAWS  
COPPER SLITTING SAWS  
SCREW SLOTTING SAWS  
COMMUTATOR SLOTTING SAWS  
JEWELERS' SLOTTING SAWS  
CUT OFF SAWS • CIRCULAR  
KNIVES & ROTARY SHEAR  
BLADES • CIRCOLOY STEEL  
SAWS • SOLID & TIPPED  
TUNGSTEN CARBIDE SAWS  
COMBINED DRILLS & COUNT-  
ERSINKS • CENTER REAMERS



## CIRCULAR TOOL CO., INC.

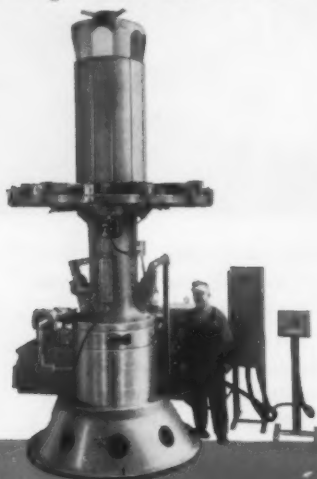
PROVIDENCE 5, RHODE ISLAND

**Specialists in Circular Cutting Tools Since 1923**



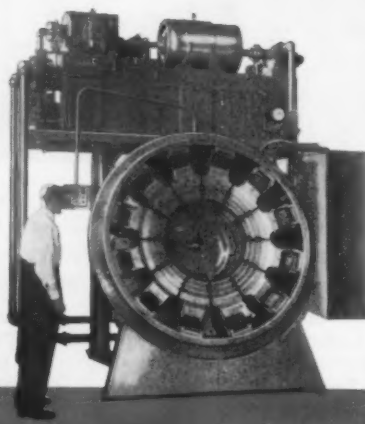
to form and size jet engine, missile  
and rocket components like these  
choose **GROTNES**

**expanders and shrinkers**



**No. 26-HV-600 HYDRAULIC  
EXPANDER**

for sizing and forming round and polysided parts. Capable of expanding 12.3 sq. in. of metal having a yield strength of 100,000 psi.



**No. 7-H-2652 HYDRAULIC  
SHRINKER**

sizes both sheet metal and heavy ring sections of aluminum, alloy steel, stainless steel, titanium. Different models available for various capacity requirements.

**GROTNES**  
Machine Works, Inc.  
5454 N. Wolcott Ave.  
Chicago 40, Ill.

**GROTNES MACHINE WORKS, Inc. (Dept. C-24)**  
5454 N. Wolcott, Chicago 40, Illinois

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_

Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.

#### **CHUCKS, Universal Three-Jaw**

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.  
Delta Power Tool Div., 400 Lexington Ave., Pittsburgh 8, Pa.  
Gisholt Mch. Co., Madison 10, Wis.  
Homstrand, Inc., Larchmont, N. Y.  
Horton Chuck, Windsor Locks, Conn.  
Kearney & Trecker Corp., Milwaukee 14, Wis.  
Logansport Mch. Co., Inc., Logansport, Ind.  
Skinner Chuck Co., 95 Edgewood Ave., New Britain, Conn.  
Warner & Swasey, 5701 Carnegie Ave., Cleveland 3, Ohio.

#### **CHUCKS, Wrenchless**

Gisholt Mch. Co., Madison 10, Wis.

#### **CIRCUIT-BREAKERS**

General Electric Co., Schenectady 5, N. Y.

#### **CLAMPS, "C", Toggle, Toolmakers'**

Parallel—See Set-Up Equipment  
Spacing Equipment

#### **CLEANERS, Metal**

Oakite Products, Inc., 19 Rector St., New York, N. Y.

#### **CLUTCHES**

Cleveland Punch & Shear Works, Co., 3917 St. Clair Ave., Cleveland 14, Ohio.  
Dynamatic Div. Eaton Mfg. Co., Kenosha, Wis.  
Fawick Corp., Cleveland, Ohio.  
Minster Mch. Co., Minster, Ohio.  
Rockford Clutch Div., Rockford, Ill.

#### **COLLETS—See Chucks, Collet**

#### **COMBINATION SQUARES—See Machinists' Small Tools**

#### **COMPARATORS, Dial, Electronic and Air**

DoAll Co., Des Plaines, Ill.  
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.  
Hanson-Whitney Co., 169 Bartholomew Ave., Hartford 3, Conn. (dial, thread)  
Sheffield Corp., Box 893, Dayton 1, Ohio.  
Starrett, L. S., Co., Athol, Mass.

#### **COMPARATORS, Optical**

Bausch & Lomb Optical Co., Rochester, N. Y.  
DoAll Co., 54 Laurel Ave., Des Plaines, Ill.  
Eastman Kodak Co., Rochester, N. Y.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Opto-Metric Tools, Inc., 137 Varick St., New York, N. Y.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 1, N. Y.

#### **COMPOUNDS, Cleaning—See Cleaners, Metal**

#### **COMPOUNDS, Cutting, Grinding, Metal Drawing, etc.—See Cutting and Grinding Fluids**

#### **COMPRESSORS, Air**

Chicago Pneumatic Tool Co., New York 17, N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Wilson, K. R., Inc., Arcade, N. Y.



# Sanding time cut 38% with **LOWE** **VINOC**

Another example of the kind of cost-saving ideas you can get from an experienced Lowe Brothers finishing engineer. Here's the story:

"I suggested Lowe Vinoc when the plant superintendent complained about the sanding time required with another product. Now they save 38% in sanding man-hours by spray finishing with Vinoc, and they're well pleased with its appearance. The 38% is their figure."

Let a Lowe Brothers finishing engineer help *you* find ways to reduce costs. He knows finishes *and* methods — and he'll gladly make a "flow-chart" analysis of your finishing system if you'll send the coupon. No obligation, of course.

## **LOWE BROTHERS** **INDUSTRIAL FINISHES**

QUALITY UNSURPASSED SINCE 1870



Style-tested paints for Home and Industry

**REPRESENTATIVES IN:** Chicago, Ill.  
Boston, Mass. • Jersey City, N. J.  
Cleveland, Ohio • Pittsburgh, Pa.  
Rochester, N. Y. • Dayton, Ohio  
Columbus, Ohio • Milwaukee, Wis.  
Indianapolis, Ind. • Cincinnati, Ohio  
Detroit, Mich. • Springfield, Mass.  
Philadelphia, Pa.



The Lowe Brothers Company  
Dayton 2, Ohio

M

☐ Please have my nearest Lowe Brothers Finishing Engineer call on me as soon as possible.

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

FIRM NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

**CONTOUR FOLLOWER**—See Tracing Attachments

### CONTRACT WORK

Bliss, E. C., Co., 1375 Raff Rd., S. D., Canton, Ohio.  
Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio.  
Eisler Engrg. Co., 750 S. 13th St., Newark 3, N. J.  
Hartford Special Machinery Co., 287 Homestead St., Hartford, Conn.  
Kearney & Trecker Corp., Milwaukee 14, Wis.  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
Van Keuren Co., Watertown, Mass.

### CONTROLLERS

Allen-Bradley Co., 1331 S. 1st St., Milwaukee, Wis.  
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

**CONTROL SHAFTS**—See Lead-screws & Splines, Ball Bearing

### CONVEYORS FOR DUST, CHIPS, ETC.

Barnes, W. F. & John Co., Rockford, Ill.  
Commercial Filters Corp., Melrose, Mass.

### COPPER

American Brass Co., 25 Broadway, New York, N. Y.

Mueller Brass Co., Port Huron 35, Mich.  
Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

### COUNTERBORES AND COUNTERSINKS

Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Circular Tool Co., Inc., 765 Allens Ave., Providence 5, R. I.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
DoAll Co., Des Plaines, Ill.  
Ex-Cell-O Corp., 120 Oakman Blvd., Detroit 32, Mich.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York  
Heiler Tool Co., Newcomerstown, Ohio.  
National Twist Drill & Tool Co., Rochester, Mich.  
Scully-Jones & Co., 1906 Rockwell St., Chicago 8, Ill.  
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.  
Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mass.

### COUNTERS

Starrett, The L. S., Co., Athol, Mass.

### COUPLINGS

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
Boston Gear Works, 14 Hayward St., Quincy 71, Mass.  
James, D. O., Gear Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.  
Mueller Brass Co., Port Huron, Mich.  
Philadelphia Gear Works, Erie Ave., and G Sts., Philadelphia, Pa.  
Schrader's Sons, A., 470 Vanderbilt Ave., Brooklyn 38, N. Y.  
Standard Pressed Steel Co., Jenkintown, Pa. (Shaft)  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.  
Walker Co., Inc., O. S., Rockdale St., Worcester, Mass.

### CRANES, Electric Traveling

Cleveland Crane & Engrg. Co., Wickliffe, Ohio.

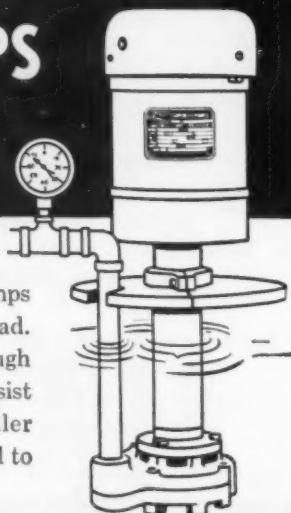
### CUTTERS, Keyseating

Davis Keyseater Co., 405 Exchange St., Rochester 8, N. Y.  
DoAll Co., Des Plaines, Ill.  
du Mont Corp., Greenfield, Mass.  
Mitts & Merrill, 1009 So. Water St., Saginaw, Mich.  
National Twist Drill Co., Rochester, Mich.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

### CUTTERS, Milling

Apex Tool & Cutter Co., Inc., 235 Canal St., Shelton, Conn.  
Barber-Colman Co., 1300 Rock St., Rockford, Ill.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill. (End mills)  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio  
DoAll Co., Des Plaines, Ill.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Gorton, George, Mch. Co., 1321 Racine St., Racine, Wis.  
Hanson-Whitney Co., 169 Bartholomew Ave., Hartford 3, Conn. (dial, thread)  
Haynes Stellite Co., Kokomo, Ind.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Kennametal, Inc., Latrobe, Pa.  
Lovejoy Tool Co., Inc., Springfield, Vt.  
Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
National Twist Drill & Tl. Co., Rochester, Mich.  
Onsrud Machine Works, Inc., Niles, Ill.  
Tomkins-Johnson Co., Jackson, Mich.  
Vascoloy-Ramet Corp., Waukegan, Ill.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

## Need Pressure AND Volume? these GRAYMILLS *Superflo* COOLANT PUMPS give you BOTH!



These compact, dependable coolant pumps can give you up to 10 GPM at 65 ft. head. They provide abundant flow even through a maze of pipes and fittings. They resist wear and binding because the impeller floats on a cushion of liquid — no metal to metal contact, no seals, no packing.

Even if you don't need this "high head" performance, you'll find Standard Superflos for every normal need from  $\frac{1}{2}$  to 1  $\frac{1}{2}$  H.P.

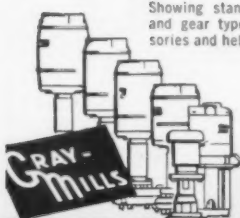
Model 30JH-1 1 HP—Various Lengths. 10 GPM at 65' head. Amazingly compact. Interchangeable with  $\frac{1}{4}$  HP Models.

145

*Pumps only or complete pumping units with tanks. Sold by leading Industrial Distributors everywhere. Graymills representatives near you are ready to help with special problems.*

### WRITE FOR THIS NEW CATALOG 56JH

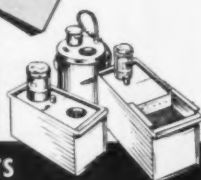
Showing standard and JIC model centrifugal and gear type Pumps, Pumping Units, Accessories and helpful selection chart.



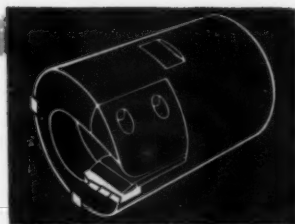
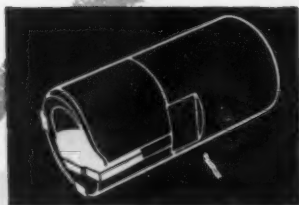
GRAYMILLS CORPORATION  
3761 N. Lincoln Ave., Chicago 13, Ill.

# GRAYMILLS

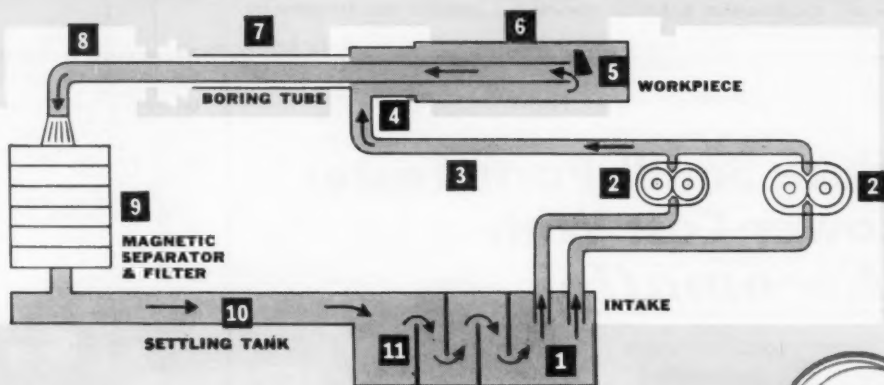
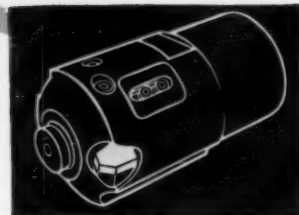
*Superflo* COOLANT PUMPS AND UNITS







Tools for drilling, trepanning and boring developed and patented by Heller.



In consecutive order, the numbers show the path of Shell Garia Oil 115 through a typical boring machine.



BORING AND TREPPANNING  
ASSOCIATION

## Revolutionary new rapid boring tools last 50% longer with Shell Garia Oil 115

American Heller Corporation is introducing to the U.S.A. new tools for extremely high-speed boring, trepanning and drilling of deep holes. These precision tools offer the double advantage of high-speed accuracy and excellent finish.

Used in conjunction with suitable boring machines, the tools make use of this new technique:

*Cutting oil is forced between the boring bar and wall of stock, forming a*

*continuous bearing. The oil is forced back through the hollow boring bar, carrying away the chips as it goes. Tool faces are kept clean and chip passage clear. Chips do not come in contact with finished bore. This insures greater accuracy at higher speeds and feeds than ever before possible.*

This operation required a cutting oil with extreme pressure and excellent cooling characteristics. Working with Heller, Shell engineers devel-

oped Garia® Oil 115. Experience with the new cutting oil has proved that tool life is increased 50% over conventional drilling or cutting oils. Garia Oil 115 is approved and recommended by the Boring and Trepanning Association.

For more information on Shell Garia Oil 115, write to Shell Oil Company, 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, California.

### SHELL GARIA OIL 115



**CUTTING AND GRINDING FLUIDS**

Cincinnati Milling Products Div., Cincinnati, Ohio.

Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio.

Cities Service Oil Co., 70 Pine St., New York, N. Y.

DoAll Co., Des Plaines, Ill.

Oakite Products, Inc., 26 Rector St., New York 6, N. Y.

Shell Oil Co., 50 W. 50th St., New York, N. Y.

Shell Refining Co., 600 Fifth Ave., New York, N. Y.

Stuart, D. A. Oil Co. Ltd., 2727 S. Troy St., Chicago 23, Ill.

Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

Texas Co., 135 E. 42nd St., New York, N. Y.

**CUTTING-OFF MACHINES, Lathe Type**

Bardons & Oliver, Inc., 1133 West Ninth St., Cleveland 13, Ohio.

Brown & Sharpe Mfg. Co., Providence, R. I.

Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio.

Cone Automatic Mch. Co., Windsor, Vt.

Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

Modern Machine Tool Co., Jackson, Mich.

**CUTTING-OFF SAWS, Abrasive Wheel**

Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh, Pa.

DoAll Co., Des Plaines, Ill.

Norton Co., 1 New Bond St., Worcester 6, Mass.

Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 35, Pa.

Wallace Supplies Mfg. Co., 1308 Diversey Parkway, Chicago 14, Ill.

**CUTTING TOOLS—See Tool Material****CYLINDERS, Air**

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.

Hannifin Corp., 501 Wolf Rd., Des Plaines, Ill.

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.

Logansport Mch. Co., Inc., Logansport, Ind.

Thompson Products, Inc., Warren, Mich.

Tomkins-Johnson Co., Jackson, Mich.

**CYLINDERS, Hydraulic**

Barnes, John S., Corp., 301 S. Water St., Rockford, Ill.

Chicago Pneumatic Tool Co., New York 17, N. Y.

Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill.

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.

Logansport Machine Co., Inc., Logansport, Ind.

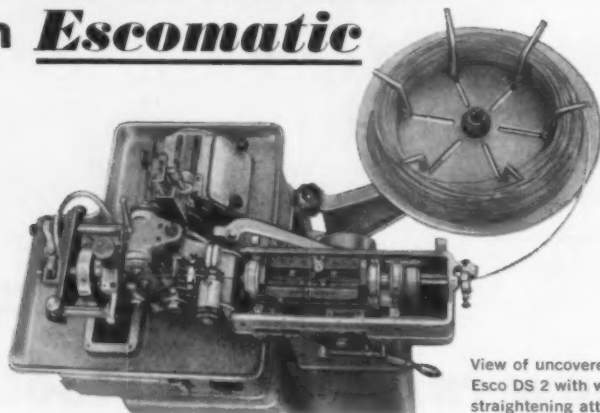
Oilgear Co., 1569 W. Pierce St., Milwaukee Wis.

Thompson Products, Inc., Warren, Mich.

Vickers, Inc., Detroit 32, Mich.

Wilson, K. R., Inc., Arcade, N. Y.

# Produce Small Parts Faster At Lower Cost With An *Escomatic*



View of uncovered  
Esco DS 2 with wire  
straightening attachment.

**Feed from Coil or Bar Stock**

| TYPICAL PARTS<br>MADE BY AN ESCOMATIC |  |
|---------------------------------------|--|
|                                       |  |
| 12 parts/min. Commercial Bronze       |  |
|                                       |  |
| 6 parts/min. Pinion Stock             |  |
|                                       |  |
| 63 parts/min. Nickel-Silver           |  |

Up to 100 precision parts per minute are possible on the Esco DS 2, a Swiss form-turning and cut-off machine. Stock, fed from coils or bars of any length, is machined by two revolving cutting tools mounted in a cam controlled tool head. Resulting parts are clean, accurate and **entirely burr-free**—and are delivered separate from the chips. Coil feed provides efficiency up to 95%, eliminates bar ends, speeds production.

- Capacity Up to 5/32" dia. x 3 3/4" length
- Accuracy As close as  $\pm .00025"$
- Finish As fine as 8 micro-inches

**Write For Additional Information**

## COSA

—nationwide sales and service of precision machine tools—  
—from bench lathes to boring mills.

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N. Y.

In Canada—Cosa Corporation of Canada, Ltd., 1160 Lakeshore Road, Long Branch, Toronto 14, Ontario

**DEBURRING MACHINES**

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.

Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.

Modern Industrial Eng. Co., 14230 Birwood Ave., Detroit 38, Mich.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

Sheffield Corp., Box 893, Dayton 1, Ohio

Wallace Supplies Mfg. Co., 1308 Diversey Parkway, Chicago 14, Ill.

**DEMAGNETIZERS**

Blanchard Mch. Co., 64 State St., Cambridge, Mass.

Lufkin Rule Co., Saginaw, Mich.

**DIE CASTINGS—See Casting, Die****DIE CASTING MACHINES**

Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio

Hydraulic Press Mfg. Co., Mount Gilead, Ohio

Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.

**DIE CUSHIONS**

Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio

Clearing Mch. Corp., 6499 W. 65th St., Chicago, Ill.

Danly Mch. Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.

Dayton Rogers Mfg. Co., Minneapolis, Minn.

Federal Machine & Welder Co., Overland Ave., Warren, Ohio

Minster Mch. Co., Minster, Ohio

Verson Allsteel Press Co., 93rd St., and S. Kenwood Ave., Chicago, Ill.

**DIEING MACHINES**

Pratt & Whitney Co., Inc., West Hartford, Conn.

**DIE INSERTS, Carbide**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

Kennametal Inc., Latrobe, Pa.

Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.

Vascoloy-Ramet Corp., Waukegan, Ill.

**DIE SETS AND DIEMAKERS' SUPPLIES**

Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio

Danly Mch. Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.

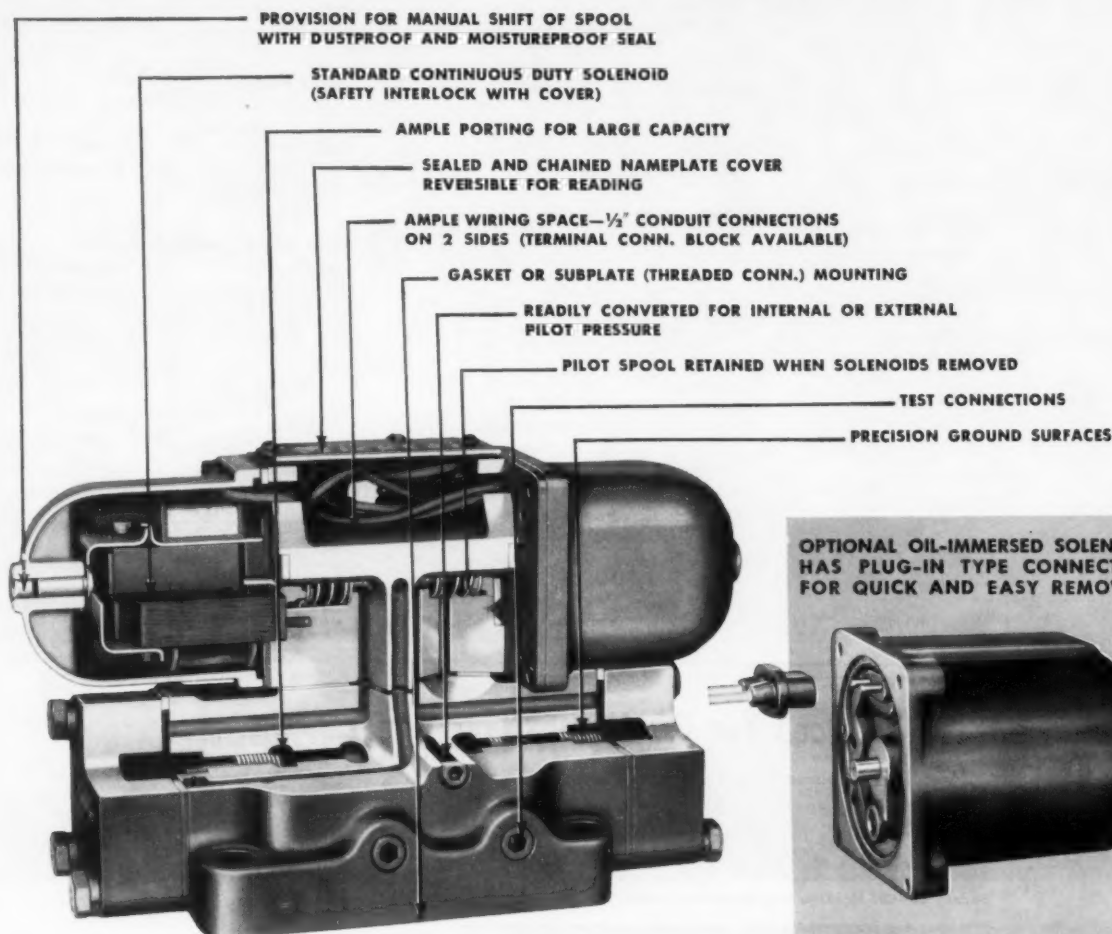
Product Mch. Co., 985 Housatonic Ave., Bridgeport 1, Conn.

U. S. Tool Co., Inc., 255 North 18th St., Amherst, N. J.

Wales-Strippit Co., Akron, N. Y.

# Only **VICKERS** DIRECTIONAL VALVES

## Have *all* These Features



7897

### REDUCED DOWN-TIME LONGER SOLENOID LIFE LESS MAINTENANCE EASIER INSTALLATION

Vickers hydraulic 2- and 4-way valves provide the optimum in directional control. They are compact, versatile, and are designed for heavy duty, continuous and rapid cycling operation on all types of industrial machinery. More than a decade of application experience and years of research and development back all the valves' features.

Seven spool types satisfy a wide variety of circuit needs and operate at pressures to 3000 psi. Optional oil-immersed solenoids operate cooler, increasing service life 20 to 30 times.

Installation is simplified with ease of wiring and a minimum of piping. The valves are available for gasket or sub-plate mounting. Mounting position is unrestricted except in "no-spring" models. The optional oil-immersed solenoid

has a plug-in type connector and is available in all standard voltages. Field modification of existing units can be made to incorporate heavy-duty, oil-immersed solenoids.

The valves conform to JIC Standards and are available in  $\frac{1}{8}$ " and  $\frac{1}{4}$ " direct solenoid operated models . . .  $\frac{3}{4}$ ",  $1\frac{1}{4}$ ", 2", and 3" solenoid controlled pilot operated models. These valves cover the flow range from 1.25 gpm to 320 gpm.

For further information, write for Installation Drawing I-182412.

### VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

Machinery Hydraulics Division

ADMINISTRATIVE and ENGINEERING CENTER

Department 1403 • Detroit 32, Michigan

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI  
CLEVELAND • DETROIT • GRAND RAPIDS • HOUSTON • LOS ANGELES AREA  
(El Segundo) • MINNEAPOLIS • NEW YORK AREA (Springfield, N.J.) • PHILADELPHIA  
AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) • PORTLAND, ORE. • ROCHESTER  
ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA  
WORCESTER

FACTORIES ALSO IN AUSTRALIA, ENGLAND AND GERMANY  
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto and Montreal

**DIE SINKING MACHINES**—See Milling Machines, Die Sinking, etc.

**DIE STOCKS**—See Stocks and Dies

**DIES, Blanking, Forming, Drawing, Extruding, etc.**

Bath, Cyril Co., 32324 Aurora Road, Solon, Ohio  
Cincinnati Shaper Co., Hopple & Garrard, Cincinnati, Ohio  
Dreis & Krump Mfg. Co., 7400 Loomis Blvd., Chicago 36, Ill.  
Ferracute Mch. Co., Bridgeton, N. J.  
Metal Carbides Corp., Youngstown, Ohio  
Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Moore Special Tool Co., Inc., 740 Union Ave., Bridgeport 7, Conn.  
Niagara Mch. & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
Olafsson Corp., Lansing, Mich.  
Ryerson & Son, Inc., Jos. T., 16th & Rockwell Sts., Chicago 8, Ill.  
Vascoloy-Ramet Corp., Waukegan, Ill.  
Version Allsteel Press Co., 93rd St., and S. Kenwood Ave., Chicago, Ill.  
Wales-Strippit Corp., North Tonawanda, N. Y.

**DIES, Lettering and Embossing**

Wales-Strippit Corp., North Tonawanda, N. Y.

**DIES, Self-opening Threading**

Consolidated Mch. Tool Div., 565 Blossom Rd., Rochester 10, N. Y.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Landis Mch. Co., Waynesboro, Pa.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio

**DIES, Thread Cutting**—See Stocks and Dies

**DIES, Thread Rolling**

Landis Machine Co., Waynesboro, Pa.

National Acme Co., 170 E. 131st St., Cleveland 8, Ohio  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Reed Rolled Thread Die Co., P. O. Box 350, Worcester 1, Mass.

**DISINTEGRATORS**

Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Electro-Spark Co., Inc., 23 E. 26th St., New York 10, N. Y.  
Elox Corp., Royal Oak 3, Mich.

**DIVIDERS AND TRAMMELS**—See Layout and Drafting Tools

**DIVIDING HEADS**—See Indexing and Spacing Equipment

**DOWEL PINS**

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn.  
Dartly Mch. Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.  
DoAll Co., Des Plaines, Ill.  
Producta Machine Co., 985 Housatonic Ave., Bridgeport, Conn.  
Standard Pressed Steel Co., Jenkintown, Pa.  
U. S. Tool Co., Inc., 255 North 18th St., Amherst, N. J.

**DRAWING COMPOUNDS**

Oakite Products, Inc., 26 Rector St., New York 6, N. Y.  
Stuart, D. A. Oil Co. Ltd., 2727 S. Troy St., Chicago 23, Ill.

**DRESSERS, Grinding Wheel**

Colonial Broach & Machine Co., P. O. Box 37, Harper St., Detroit 13, Mich.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Hamilton Tool Co., 834 S. 9th St., Hamilton, Ohio

Metal Carbides Corp., Youngstown, Ohio  
Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.  
Norton Co., 1 New Bond St., Worcester, Mass.  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Sheffield Corp., 721 Springfield St., Dayton 1, Ohio

**DRIFT KEYS**

Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
DoAll Co., Des Plaines, Ill.  
Scully-Jones & Co., 1906 S. Rockwell St., Chicago 8, Ill.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**DRILL HEADS, Multiple Spindle**

Atlas Press Co., 20108 N. Pitcher, Kalamazoo, Mich.  
Avey Drilling Machine Co., 25 East Third St., Covington, Ky.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Baush Machine Tool Co., 15 Wascon Ave., Springfield, Mass.  
Buffalo Forge Co., Broadway, Buffalo, N. Y.  
Cross Co., 3250 Bellevue, Detroit 7, Mich.  
Davis & Thompson Co., 4460 N. 124th St., Milwaukee 10, Wis.  
Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh, Pa.  
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.  
Etico Tool Co., Inc., 594 Johnson Ave., Brooklyn 34, N. Y.  
Hartford Special Machinery Co., 387 Homestead Ave., Hartford, Conn.  
Kearney & Trecker Corp., Milwaukee 14, Wis.  
LaSalle Tool, Inc., 3840 E. Outer Drive, Detroit 34, Mich.  
Leland Gifford Co., Box 989, Worcester 1, Mass.  
National Automatic Tool Co., Richmond, Ind.  
Snyder Tool & Engrg. Co., 3400 Lafayette, Detroit 7, Mich.  
Thriftmaster Products Corp., 1076 N. Plum St., Lancaster, Pa.  
United States Drill Head Co., 616 Burns, Cincinnati, Ohio

**DRILL HEADS, Unit Type**

Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Kingsbury Mch. Tool Corp., Keene, N. H.  
Snow Manufacturing Co., Bellwood, Illinois

**DRILL SLEEVES AND EXTENSION HOLDERS**

Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, Ohio  
DoAll Co., Des Plaines, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Automatic Tool Co., Richmond, Ind.  
National Twist & Tool Co., Rochester, Mich.  
Scully-Jones & Co., 1906 S. Rockwell St., Chicago 8, Ill.

**DRILLING AND BORING UNITS, Self-contained**

Avey Drilling Machine Co., 25 East Third St., Covington, Ky.  
Barnes, W. F. & John Co., Rockford, Ill.  
Baush Machine Tool Co., 15 Wascon Ave., Springfield, Mass.  
Buhr Machine Tool Co., 839 Green St., Ann Arbor, Mich.  
Cross Co., 3250 Bellevue, Detroit 7, Mich.  
Etico Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y.  
Govro-Nelson Co., 1831 Antoinette St., Detroit 8, Mich.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Homestrand, Inc., Larchmont, N. Y.  
Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co., Kaukauna, Wis.  
Kearney & Trecker Corp., Milwaukee 14, Wis.  
LaSalle Tool, Inc., 3840 E. Outer Dr., Detroit 34, Mich.  
Leland-Gifford Co., Box 989, Worcester 1, Mass.

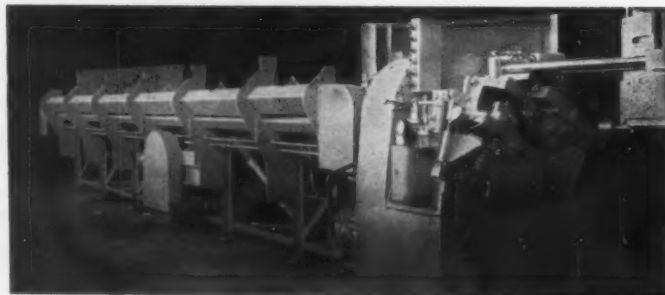
(Continued on page 306)



## Why Don't You GO MODERN?

"Do it yourself" is sometimes rough,  
But it keeps the lady trim and lean—  
Provided she works hard enough  
With a rusty cutting-off machine.

Modern Cut-Off Machine and Automatic Loader



The chances are a woman would put on weight if she were operating the modern automatic Cutting-off Machine and Automatic Stock Feeder. You simply fill the feeder—with random lengths of tubing with diameters up to 8", or bar stock.

Then you push the button and take a coffee-break. The operation is entirely automatic from then on.

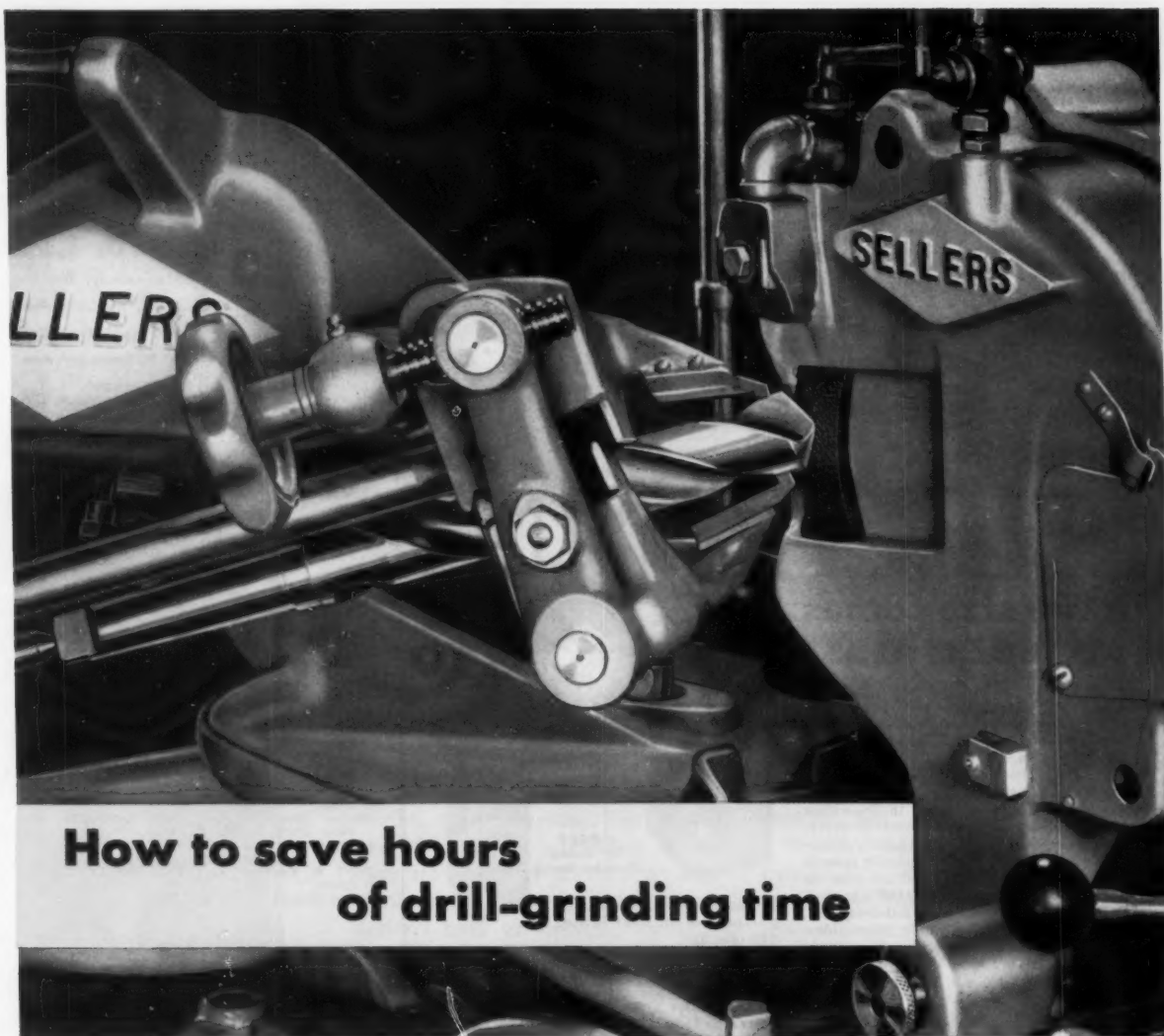
This machine is fast—accurate—economical.

Write for catalog and full information.

**MODERN MACHINE TOOL CO.**

2005 LOSEY AVENUE  
Jackson, Michigan





## How to save hours of drill-grinding time

CM-20

Minutes saved on each drill you grind soon add up to hours. That's why it will pay you to study your drill-grinding system and see how it can be speeded by using the Sellers machine.

The Sellers drill grinder is fast. A few seconds to chuck, a few passes across the point and the job's done. What's more, if you want to reclaim burned or broken drills you can remove the excess stock with a fast roughing operation followed by a finish grind. *The grinder is built for both rough and finish grinding.*

No skill is required to grind perfect drill points the Sellers

way. Operation of the chuck is so easy and quick, and operation of the machine so simple, an *unskilled* operator can accurately grind more drills than an *experienced* hand grinder.

The Sellers machine is famous for saving valuable time—for eliminating tedious hand work and for speeding any drill grinding operation.

Ask for details. Send for a copy of Bulletin 4201.

**CONSOLIDATED MACHINE TOOL DIV.**  
**FARREL-BIRMINGHAM COMPANY, INC.**  
 Rochester 10, New York  
 Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.



**CONSOLIDATED ALSO BUILDS:** Engine Lathes • Vertical Boring and Turning Mills • Floor and Planer-Type Horizontals • Planers, Double Housing and Openside • Planer-type Milling Machines • Plate Edge Planers • Vertical Slotters • Rotary and straight-line, Production-type Milling Machines • Skin Mills for Aircraft Manufacturing • Circular Cold Saws • Railroad Wheel and Axle Machinery • Special Machine Tools.

National Automatic Tool Co., S. 7th and N. Sts., Richmond, Ind.  
 Russell Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
 Sheffield Corp., Box 893, Dayton 1, Ohio  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit, Mich.  
 Townsend, H. P. Mfg. Co., Elmwood, Conn.  
 Western Machine Tool Works, Holland, Mich.

### DRILLING MACHINES, Automatic

Avey Drilling Machine Co., 25 East Third St., Covington, Ky.  
 Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
 Barnes, W. F. & John Co., Rockford, Ill.  
 Baush Machine Tool Co., 15 Wason Ave., Springfield, Mass.  
 Bodine Corp., 317 Mt. Grove St., Bridgeport 5, Conn.

Casa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Cross Co., 3250 Bellevue, Detroit 7, Mich.  
 Davis & Thompson Co., 4460 N. 124th St., Milwaukee 10, Wis.  
 Edlund Mchry. Co. Div., Cortland, N. Y.  
 Etico Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y.  
 Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
 Kearney & Trecker Corp., Milwaukee 14, Wis.  
 Kingsbury Mch. Tool Corp., Keene, N. H.  
 LaSalle Tool, Inc., 3840 E. Outer Dr., Detroit 34, Mich.  
 Leland-Gifford Co., Box 989, Worcester 1, Mass.  
 Le Maire Tool & Mfg. Co., Dearborn, Mich.  
 Modern Industrial Eng. Co., 14230 Birwood Ave., Detroit 38, Mich.  
 Moline Tool Co., Moline, Ill.  
 National Automatic Tool Co., Inc., S. 7th and N. Sts., Richmond, Ind.  
 Olofsson Corp., Lansing, Mich.  
 Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.

Secrest Machine Co., Washington, D. C.  
 Snow Manufacturing Co., Bellwood, Ill.  
 Townsend H. P., Mfg. Co., Elmwood, Conn.  
 Wales-Strippit Corp., Akron, N. Y.

### DRILLING MACHINES, Bench

Atlas Press Co., 20108 N. Pitcher, Kalamazoo, Mich.  
 Avey Drilling Machine Co., 25 East Third St., Covington, Ky.  
 Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
 Cincinnati Lathe & Tool Co., Marburg Ave., Cincinnati 9, Ohio  
 Casa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh, Pa.  
 Edlund Machinery Co. Div., Cortland, N. Y.  
 Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio  
 Hamilton Tool Co., 834 S. 9th St., Hamilton, Ohio  
 Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
 Henry & Wright Div., Hartford, Conn.  
 Leland-Gifford Co., Box 989, Worcester, Mass.  
 South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.

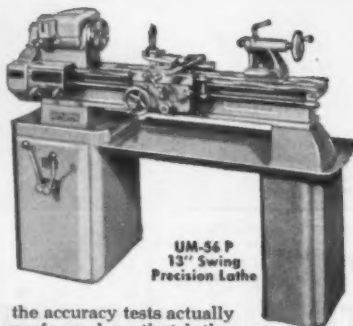
# SHELDON Precision LATHES

## for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13" . . . in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, lever-shift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards for Toolroom Accuracy. With every Sheldon Lathe goes a copy of



UM-56 P  
13" Swing  
Precision Lathe

the accuracy tests actually performed on that lathe. (19 checks).

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "I-shot" lubrication of carriage.

Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

**SHELDON MACHINE CO., INC.**  
 4246 North Knox Avenue, Chicago 41, Illinois

Gentlemen: Please send new catalogs describing:

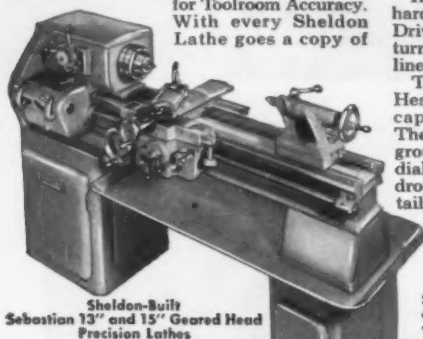
- ☐ Sheldon 10", ☐ 11" ☐ 13" Lathes  
☐ Sebastian 13" and 15" Geared Head Lathes  
☐ Horizontal Milling Machine ☐ Name of Local Dealer  
☐ Sheldon 12" Shaper ☐ Have representative Call.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company Name \_\_\_\_\_

Street Address \_\_\_\_\_ ☐ Company ☐ Home

City \_\_\_\_\_ State \_\_\_\_\_



Sheldon-Built  
Sebastian 13" and 15" Geared Head  
Precision Lathes



SHELDON  
Horizontal Milling Machine



SHELDON  
12" Shaper

**SHELDON MACHINE CO., Inc.**

Builders of Sheldon Lathes, Milling Machines,  
 Shapers and Sebastian Lathes.

4246 North Knox Ave • Chicago 41, Ill.

VISIT US AT BOOTH NO. 1864

AT THE CHICAGO METAL SHOW

NOV. 4th-8th CHICAGO AMPHITHEATRE

### DRILLING MACHINES, Gang, Multiple-spindle

Avey Drilling Machine Co., 25 East Third St., Covington, Ky.  
 Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
 Barnes, W. F. & John Co., Rockford, Ill.  
 Baush Machine Tool Co., 15 Wason Ave., Springfield, Mass.  
 Bodine Corp., 317 Mt. Grove St., Bridgeport 5, Conn.  
 Cincinnati Bickford Div., Oakley, Cincinnati, Ohio  
 Cleereman Machine Tool Co., Green Bay, Wis.  
 Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Davis & Thompson Co., 4460 124th St., Milwaukee 10, Wis.  
 Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh, Pa.  
 Edlund Machinery Co. Div., Cortland, N. Y.  
 Foote-Burt Co., 1300 St. Clair Ave., Cleveland, Ohio  
 Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio  
 Greenlee Bros. & Co., 136 12th St., Rockford, Ill.  
 Hamilton Tool Co., 834 So. 9th St., Hamilton, Ohio  
 Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
 Henry & Wright Div., Hartford, Conn.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 La Salle Tool, Inc., 3840 E. Outer Drive, Detroit 34, Mich.  
 Leland-Gifford Co., Box 989, Worcester, Mass.  
 Le Maire Tool & Mfg. Co., Dearborn, Mich.  
 Modern Industrial Eng. Co., 14230 Birwood Ave., Detroit 38, Mich.  
 Moline Tool Co., Moline, Ill.  
 National Automatic Tool Co., Inc., S. 7th and N. Sts., Richmond, Ind.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
 South Bend Lathe Works, South Bend 22, Ind.  
 Western Machine Tool Works, Holland, Mich.

Mr. E. J. Dease, Purchasing Agent of Ekco-Alcoa Containers, Inc., likes the high strength and capacity of Perf-embossed® Scott Wipers, reports they're ideal for such jobs (below) as soaking up lapping compound from die draw rings, wiping grease from the ways of a punch press, cleaning fittings and tubes on a rolling mill.



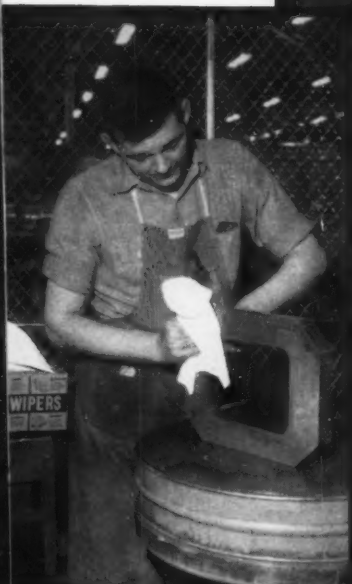
People buy Scott Wipers for many reasons:

**Ekco-Alcoa simplifies storage, handling, in-plant distribution with Scott Wipers!**

Scott Wipers have been popular at Ekco-Alcoa—world's largest rigid aluminum foil container plant—since production started. Reasons: Scott Wipers save labor time, do an efficient job, reduce fire hazards. Workers don't have to rummage in bins for usable wipers—don't have to separate, count, or gather up used wipers—don't use wipers too long, or waste them through

half use. Soft, absorbent Scott Wipers are uniform and are easily disposed of! Another reason: Scott Wipers cost less than old rags.

Want the facts on how other industries have cut wiping costs? Call your local Scott Distributor. He's in the Yellow Pages, under "Paper Towels." Or write: Scott Paper Company, Department M-711, Chester, Penna.



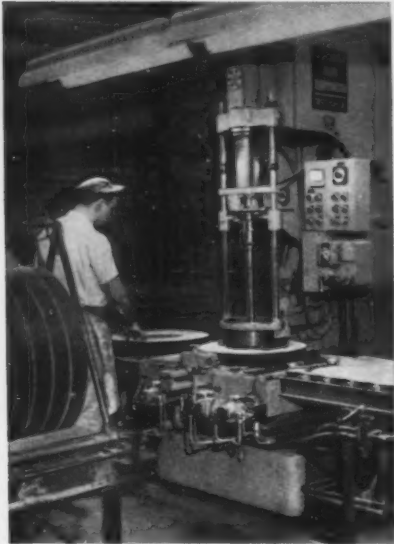
Maker of the famous Scott paper products you use in your home. See "Father Knows Best" and "The Gisele MacKenzie Show" on NBC-TV.



# Why MICROHONING

## Lowers Costs, Increases Production, Improves Quality of Grinding Wheels

Bay State Abrasive Products Company, one of the largest and most progressive manufacturers of abrasive products, Microhones the arbor hole of their snagging wheels to secure improved wheel performance, reduce manual handling, lower processing costs and increase production.



### Why Microhoning Saves Time, Energy and Reduces Processing Costs of Arbor Holes over 50%:

1. **Less Equipment**—one Microhoning machine does work of two grinders.
2. **Less Operating Costs**—Microhoning processes 450 to 600 grinding wheels per set of abrasive sticks; abrasives cost was substantially higher with former grinding method.
3. **Less Maintenance**—Hydrohoner has no chucks to maintain and there is now only one machine instead of two.
4. **Less Gaging**—Microhoning automatically brings arbor hole to size within .003" tolerance; former grinding method required repeated gaging during operation.

### Why Microhoning Improves Performance of Grinding Wheels:

1. **Better Fit**—inherent qualities of the Microhoning process are geometric accuracy and ability to hold close tolerances . . . rounder and accurately sized arbor holes assure a better fit.
2. **Less Arbor Wear**—Microhoning cuts both abrasive grain and resinoid bond while producing a smoother hole.
3. **Less Chatter**—Microhoning assures arbor holes that are square with faces and more concentric with O.D.

See page to right for "How Microhoning" accomplishes the above results.

The principles and application of Microhoning are explained in a 30-minute, 16mm, sound movie, "Progress in Precision" . . . available at your request.

- ☐ Please send me "Progress in Precision" in time for showing on \_\_\_\_\_ (date).
- ☐ Please have a Micromatic Field Engineer call.
- ☐ Please send Microhoning literature and case histories.

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



# MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

### DRILLING MACHINES, Radial

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
 American Tool Works Co., Pearl and Eggleston Ave., Cincinnati, Ohio  
 Carlton Mch. Tool Co., 2961 Meeker St., Cincinnati 25, Ohio  
 Cincinnati Bickford Div., Oakley, Cincinnati, Ohio  
 Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio  
 Cincinnati Lathe & Tool Co., Marburg Ave., Cincinnati 9, Ohio  
 Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Foote-Burt Co., 1300 St. Clair Ave., Cleveland, Ohio  
 Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio  
 Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
 Onsrud Machine Works, Inc., Niles, Ill.  
 Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
 Western Machine Tool Works, Holland, Mich.

### DRILLING MACHINES, Sensitive

Atlas Press Co., 20108 N. Pitcher, Kalamazoo, Mich.  
 Avey Drilling Machine Co., 25 East Third St., Covington, Ky.  
 Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
 Cincinnati Bickford Div., Oakley, Cincinnati, Ohio  
 Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Cincinnati 9, Ohio  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh, Pa.  
 Edlund Machinery Co. Div., Cortland, N. Y.  
 Foote-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio  
 Fosdick Mch. Tool Co., 1638 Blue Rock St., Cincinnati 23, Ohio  
 Hamilton Tool Co., 834 S. 9th St., Hamilton, Ohio  
 Henry & Wright Div., Hartford, Conn.  
 Leland-Gifford Co., Box 989 Worcester, Mass.  
 Levin & Son, Inc., Louis, 3610 So. Broadway, Los Angeles, Calif.  
 National Automatic Tool Co., Inc., S. 7th and N. St., Richmond, Ind.  
 Snow Manufacturing Co., Bellwood, Illinois  
 South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
 Townsend, H. P. Mfg. Co., Elmwood, Conn.  
 Wales-Strippit Corp., Akron, N. Y.  
 Western Machine Tool Works, Holland, Mich.

### DRILLING MACHINES, Universal Radial

Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co., Kaukauna, Wis.

### DRILLING MACHINES, Upright

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
 Avey Drilling Machine Co., 25 East Third St., Covington, Ky.  
 Barnes, W. F. & John Co., Rockford, Ill.  
 Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
 Canton Tool Mfg. Co., E. Canton, Ohio  
 Cincinnati Bickford Div., Oakley, Cincinnati, Ohio  
 Cincinnati Lathe & Tool Co., Marburg Ave., Cincinnati 9, Ohio  
 Cleereman Machine Tool Co., Green Bay, Wis.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Etico Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y.  
 Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati, 23 Ohio  
 Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.



Homestrand, Inc., Larchmont, N. Y.  
Ingersoll Milling Mch. Co., 2442 Douglas St.,  
Rockford, Ill.  
Le Maire Tool & Mfg. Co., Dearborn, Mich.  
National Automatic Tool Co., Inc., S. 7th and  
N. St., Richmond, Ind.  
Rehnberg-Jacobson Mfg. Co., 2135 Kishwau-  
kee St., Rockford, Ill.  
Snow Manufacturing Co., Bellwood, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison  
St., South Bend, Ind.  
Wales-Strippit Corp., Akron, N. Y.  
Western Machine Tool Works, Holland, Mich.

**DRILLS, Center**

Chicago-Latrobe, 411 W. Ontario St., Chicago  
10, Ill.  
Circular Tool Co., Inc., 765 Allens Ave., Prov-  
idence 5, R. I.  
Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland, Ohio  
DoAll Co., Des Plaines, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester,  
Mich.  
Threadwell Tap & Die Co., 16 Arch St., Green-  
field, Mass.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

**DRILLS, Core**

Ace Drill Corp., Adrian, Mich.  
Chicago-Latrobe, 411 W. Ontario St., Chicago  
10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland 14, Ohio  
DoAll Co., Des Plaines, Ill.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
32, Mich.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Metallurgical Products Dept. of General Elec-  
tric Co., Box 237, Roosevelt Park Annex,  
Detroit 32, Mich.  
National Twist Drill & Tl. Co., Rochester,  
Mich.  
Scully-Jones & Co., 1906 Rockwell St., Chi-  
cago 8, Ill.  
Wesson Co., 1220 Woodward Heights Blvd.,  
Ferndale, Mich.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

**DRILLS, Deep Hole, Gun**

Ace Drill Corp., Adrian, Mich.  
Chicago-Latrobe, 411 W. Ontario St., Chicago  
10, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tl. Co., Rochester,  
Mich.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

**DRILLS, Oil Hole, Oil Tube**

Chicago-Latrobe, 411 W. Ontario St., Chicago  
10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland 14, Ohio  
DoAll Co., Des Plaines, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tl. Co., Rochester,  
Mich.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

**DRILLS, Portable Electric**

Chicago Pneumatic Tool Co., New York 17,  
N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York  
4, N. Y.  
Thor Power Tool Co., Prudential Plaza, Chi-  
cago 1, Ill.

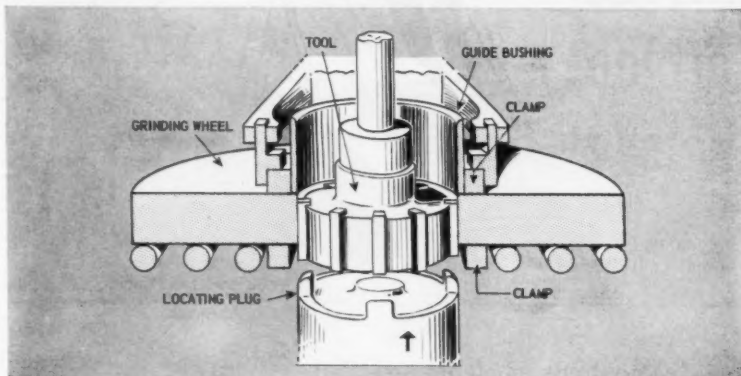
**DRILLS, Portable Pneumatic**

Chicago Pneumatic Tool Co., New York 17,  
N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York  
4, N. Y.  
Onsrud Machine Works, Inc., Niles, Ill.  
Thor Power Tool Co., Prudential Plaza, Chi-  
cago 1, Ill.

# How MICROHONING

## Lowers Costs, Increases Production, Improves Quality of Grinding Wheels

By changing from grinding to Microhoning of arbor holes, Bay State Abrasive Products Company has realized substantially lower processing costs, raised productivity and improved the performance qualities of their snagging wheels.



### Here's How Microhoning Now Saves Time, Labor, Material and Processing Costs:

1. Snagging wheels now travel from facing machine to Hydrohoner on a conveyor—there is no manual lifting or handling.
2. A disappearing plug automatically locates wheels in Hydrohoner where they are clamped on the faces and remain stationary during Microhoning operation—there is no manual placing of wheels on chucks, or chucks to maintain.
3. One Hydrohoner does work of two grinders; and one set of Bay State iron bonded, diamond sticks Microhones from 450 to 600 resinoid-bonded wheels—less equipment to maintain and lower costs for abrasive.
4. In approximately a minute, Microhoning removes from .030" to .070" of stock from arbor holes ranging in diameter from 6" to 12"—processing is faster and material is saved because wheels can now be molded closer to final size.
5. Microhoning tool automatically holds diametric accuracy within .003" tolerance—repeated manual gaging is eliminated.

See page to left for "Why Microhoning" provides cost-and-time-saving benefits.

Send Coupon for Complete Information

Learn how Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

- ☐ Please have a Micromatic Field Engineer call.  
☐ Please send Micromatic literature and case histories.

NAME \_\_\_\_\_ H

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

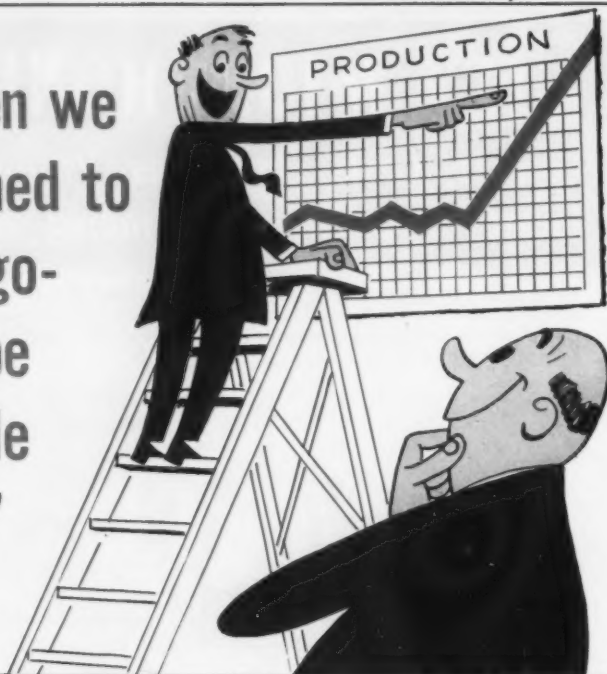
STREET \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



**MICROMATIC HONE CORP.**  
8100 SCHOOLCRAFT AVENUE • DETROIT 38 MICHIGAN

"...then we  
switched to  
Chicago-  
Latrobe  
Carbide  
Tools"



In hundreds of plants and shops, Chicago-Latrobe Carbide Drills and Reamers are helping to establish new production records. Reason? They run longer between grinds . . . they have stamina that permits faster feeds and speeds. And—they are available when and where you need them. Try them . . . call in your Chicago-Latrobe Distributor. He'll serve you promptly . . . advise you wisely.



**Chicago-Latrobe**  
CARBIDE  
**Drills and Reamers**  
FROM YOUR C-L DISTRIBUTOR

DRILLS • REAMERS • COUNTERSINKS • COUNTERBORES • GUN  
DRILLS • CARBIDE AND SPECIAL TOOLS

**CHICAGO-LATROBE**  
417 W. ONTARIO STREET, CHICAGO 10

Offices and Warehouses in: New York,  
Detroit, Chicago, Los Angeles


**DRILLS, Ratchet**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, Ohio  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**DRILLS, Subland**

Ace Drill Corp., Adrian, Mich.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 49th St., Cleveland 14, Ohio  
DoAll Co., Des Plaines, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**DRILLS, Twist, High-Speed Steel, Carbon Steel**

Ace Drill Corp., Adrian, Mich.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 49th St., Cleveland 14, Ohio  
DoAll Co., Des Plaines, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.  
Threadwell Tap & Die Co., 16 Arch, Greenfield, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**DRILLS, Twist, Carbide, Carbide-tipped**

Ace Drill Corp., Adrian, Mich.  
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, Ohio  
DoAll Co., Des Plaines, Ill.  
Heller Tool Co., Newcomertown, Pa.  
National Twist Drill & Tool Co., Rochester, Mich.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.  
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**DRILLS, Wire**

Ace Drill Corp., Adrian, Michigan  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., Cleveland, O.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**DUPLICATING ATTACHMENTS — See Tracing Attachments****DUST COLLECTORS AND CONTROL SYSTEMS**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Pangborn Corp., Hagerstown, Md.  
Standard Electrical Tool Co., 2500 River Rd., Cincinnati 14, Ohio

**ELECTRICAL DISCHARGE MACHINES — See Disintegrators****ELECTROPLATING EQUIPMENT**

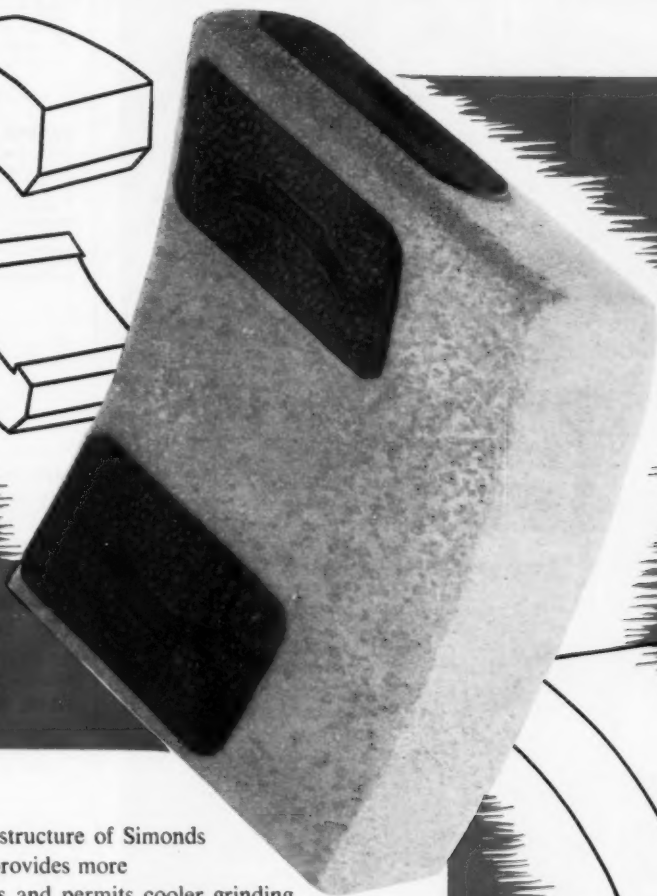
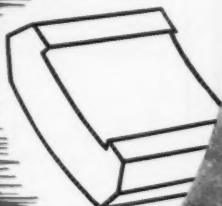
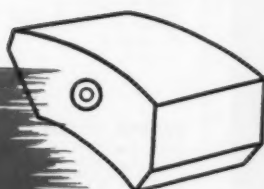
Wagner Brothers, Inc., 433 Midland Ave., Detroit 3, Mich.

**Now!**

**SIMONDS**  
ABRASIVE CO.

**abrasive segments**

with **SA Borolon<sup>®</sup>** ... for faster  
cooler grinding ...



**U**nique single crystal structure of Simonds SA Borolon Abrasive provides more stress-free cutting edges and permits cooler grinding, deeper penetration for faster stock removal, and better finish. This adds up to better surface grinding with Simonds Segments mounted in chucks—for all types of vertical spindle surface grinders. Order from your Simonds Distributor.

**SIMONDS ABRASIVE COMPANY**

Tacony & Fraley Sts., Philadelphia 37, Pa.

Division of Simonds Saw and Steel Co.

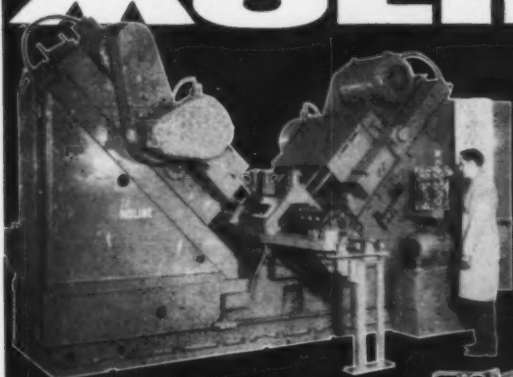
BRANCHES: PHILADELPHIA • CHICAGO • DETROIT • SHREVEPORT • LOS ANGELES  
SAN FRANCISCO • PORTLAND, ORE.

**CALL**  
YOUR SIMONDS DISTRIBUTOR



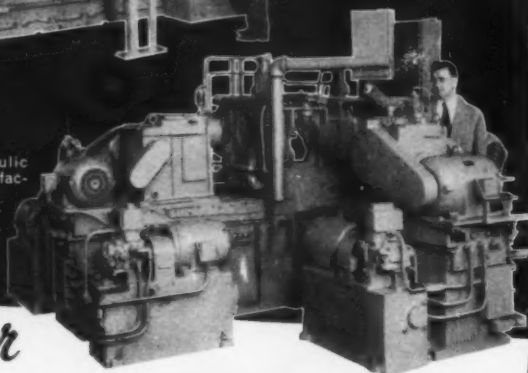
**P**roven products  
**D**ependable know-how  
**Q**uick supply

# MOLINE



No. 13CB V-type cylinder boring unit is used either as an individual machine or as one of several automated units in a transfer line for boring automotive engine cylinders.

MR138 four-way, hydraulic feed, drilling, boring and facing machine with hydraulic clamping fixture for tractor main frame housings.



*For Greater*

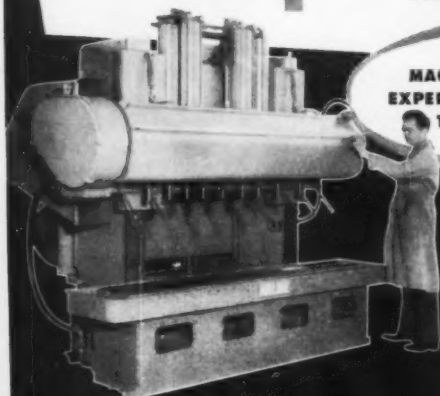
**PRODUCTION . . . EFFICIENCY . . . SAVINGS**

Use an individually designed "Hole-Hog" Machine Tool for such jobs as...

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

OVER 35 YEARS OF  
MACHINE TOOL ENGINEERING  
EXPERIENCE IS AT YOUR SERVICE.  
TELL US YOUR PARTICULAR  
PROBLEM

106



HD67 hydraulic rail feed, straight-line type, multi-spindle drilling machine. Six-foot rail length as shown; also available in eight and ten-foot lengths.

No. 116-U hydraulic rail feed, universal joint type driller with 16 two-speed and neutral top drivers plus four-speed quick change gear box. Spindles illustrated are 1 1/2" drill capacity each in mild steel.



**MOLINE TOOL COMPANY**

REPRESENTATIVES IN PRINCIPAL CITIES

100 20TH STREET • MOLINE, ILLINOIS

## ENGRAVING MACHINES

Casa Corp., 405 Lexington Ave., New York 17, N. Y.  
Gorton, Geo., Mach., 1321 Racine St., Racine Wis.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.

## EXPANDERS, Mechanical, Hydraulic

Grotnes Machine Wks., Inc., 5454 N. Walcott, Chicago 40, Illinois

## EXTRACTORS, Screw

Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Walton Co., Hartford 10, Conn.  
Williams & Co., J. H., 400 Vulcan St., Buffalo 7, N. Y.

## FACING HEADS

Cross Co., 3250 Bellevue, Detroit 7, Mich.  
Davis Boring Tool Div. Giddings & Lewis Mch. Tool Co., Fond du Lac, Wis.  
G & L and Hypro Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co., Kaukauna, Wis.  
Mummert-Dixon Co., Hanover, Pa.

## FANS, Exhaust, Ventilating

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.

## FEEDERS, Automatic

Perry Equipment & Eng. Co., Erie, Penna.  
Production Feeder Corp., Mentor, Ohio  
V & O Press Co., Hudson, New York

## FILES, Band

DoAll Co., Des Plaines, Ill.

## FILES, General-purpose, Swiss Pattern

DoAll Co., Des Plaines, Ill.  
Heller Tool Co., Newcomerstown, Ohio  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

## FILES AND BURRS, Rotary

DoAll Co., Des Plaines, Ill.  
Heller Tool Co., Newcomerstown, Ohio  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Severance Tool Ind., Inc., Saginaw, Mich.  
Simonds Saw & Steel Co., Fitchburg, Mass.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

## FILING MACHINES

Chicago Pneumatic Tool Co., New York 17, N. Y.  
DoALL Co., Des Plaines, Ill.  
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

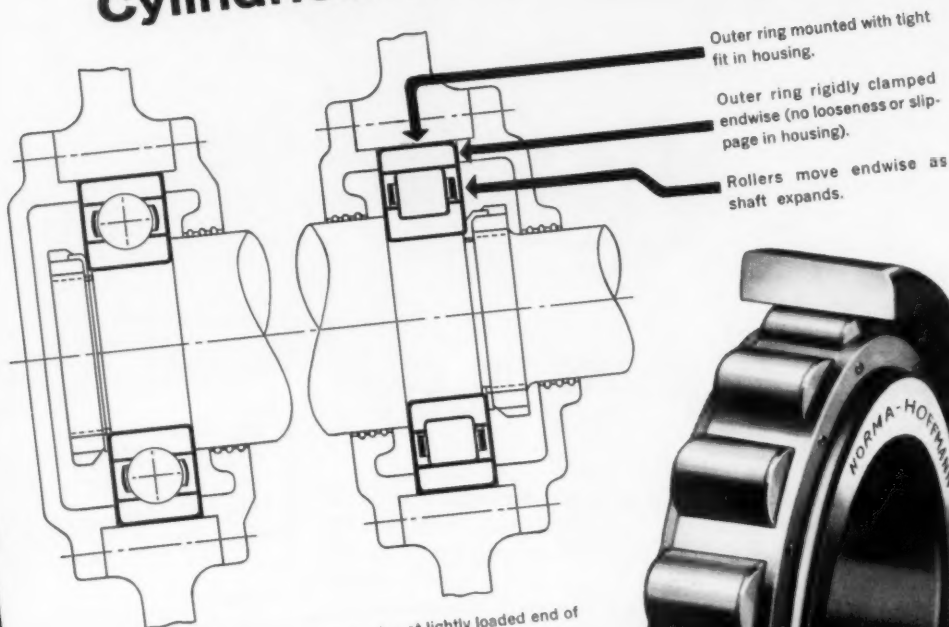
## FILTERS, Coolant and Oil

Barnes Drill Co., 814 Chestnut St., Rockford, Ill.  
Commercial Filters Corp., Melrose, Mass.  
Industrial Filtration Co., 15 Industrial Ave., Lebanon, Ind.  
Marvel Engineering Co., 7227 N. Hamlin Ave., Chicago 45, Ill.



# For Shaft Expansion and/or Heavy Radial Load...

## Use NORMA-HOFFMANN PRECISION Cylindrical Roller Bearings



Typical mounting using clamped ball bearing at lightly loaded end of shaft and clamped roller bearing at heavily loaded end.

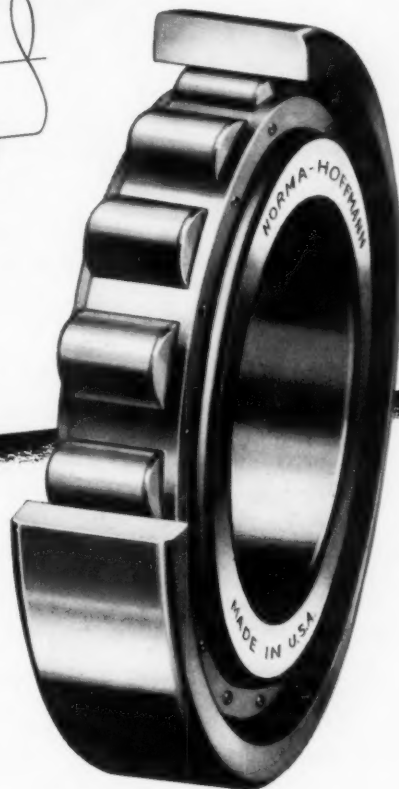
### CHECK THESE ROLLER BEARING ADVANTAGES:

1. No looseness required between outer ring and housing — as with self-contained bearings.
2. No possibility of endwise cramping of bearings — a frequent cause of heating and early failure.
3. Extra quiet and trouble free operation — due to elimination of looseness.
4. Extra heavy radial load ca-

capacity plus resistance to shock and vibration.

5. Precision limits held throughout permit extra high speed operation.
6. Interchangeable with standard single row metric ball bearings.
7. Available also in several extra light series where overall weight is important.

Norma-Hoffmann Engineers, specialists in bearing design and application, will help you with your problems. Ask for their services or write for catalog.



precision ball, roller & thrust bearings



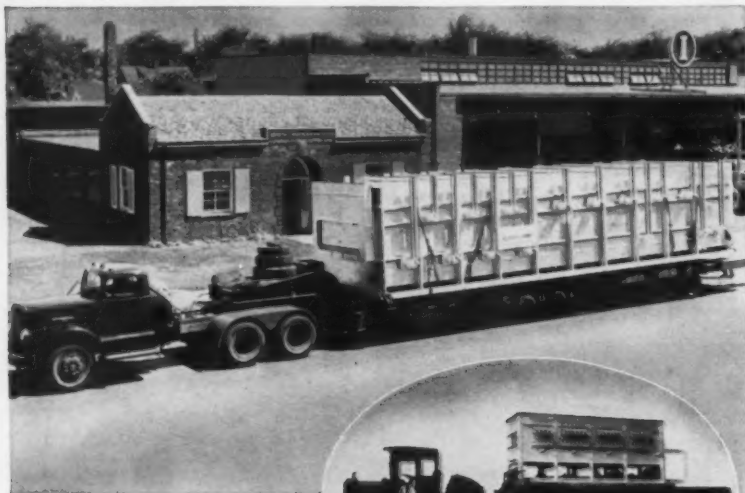
**NORMA-HOFFMANN**

BEARINGS CORPORATION • STAMFORD, CONN.

founded 1911

FIELD OFFICES: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT  
KANSAS CITY • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO • SEATTLE

# HOLCROFT • BLAZING THE HEAT TREAT TRAIL FOR OVER 40 YEARS



Furnaces, F.O.B. Detroit  
... today and yesterday

## HOLCROFT "delivers the goods"

Back in '27, Holcroft, even then a company with many years of experience to its credit, custom-designed, built and delivered the electric, non-metallic heated walking beam furnace shown in the oval above . . . and at that time it was the most advanced, efficient furnace of its type then on the market.

Today, Holcroft is still "delivering the goods" . . . in the instance illustrated, a radiant-tube heated pusher type gas-carburizing furnace for automotive transmission parts. In the transition from the old to the new, it is worthy of note that Holcroft contributed substantially to the application of radiant-tube heating to continuous furnaces and pioneered in the development of gas carburizing. The basic principle, in fact, on which *all* modern gas-carburizing furnaces operate was disclosed by Holcroft engineers in 1935.

The same pioneering spirit is a guiding principle at Holcroft today. And when this "spirit" is combined with the experience, the research, engineering and manufacturing facilities that Holcroft offers, you can readily see why it pays to let Holcroft handle all phases of your heat treat furnace projects. May we be of assistance to you?

### HOLCROFT AND COMPANY



6545 EPWORTH BOULEVARD • DETROIT 10, MICHIGAN

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. • CLEVELAND, OHIO • HARTFORD, CONN. • HOUSTON, TEXAS • PHILA., PA.  
CANADA: Walker Metal Products, Ltd., Windsor, Ontario

#### FINISHES, Machine and Metal

Lowe Bros. Co., Dayton, Ohio

#### FLAME-HARDENING MACHINES

Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Gleason Works, 100 University Ave., Rochester 3, N. Y.

#### FORGING HAMMERS, Steam and Air

Chambersburg Engrg. Co., Chambersburg, Pa.

#### FORGING MACHINES, Headers, Upsetters, Presses

Ajax Mfg. Co., 1441 Chardon Rd., Cleveland 17, Ohio  
Bliss, E. W. Co., 1375 Raff Rd. S. W., Canton, Ohio  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
National Machinery Co., Tiffin, Ohio

#### FORGINGS, Drop

Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Square, Pittsburgh 22, Pa.  
Mueller Brass Co., Port Huron 35, Mich.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.  
Wyman-Gordon Co., Worcester, Mass.

#### FORGING, Hollow-Bored

Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
Mueller Brass Co., Port Huron, Mich.

#### FORGINGS, Press

Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
Minster Mch. Co., Minster, Ohio  
Mueller Brass Co., Port Huron, Mich.  
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y. (die-pressed)  
U. S. Steel Corp., Pittsburgh, Pa.

#### FORGINGS, Upset


Bethlehem Steel Co., 701 East Third St., Bethlehem, Pa.  
New Departure Div., Bristol, Conn.  
Vanadium-Alloys Steel Co., Latrobe, Pa.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### FORMING MACHINES, Cold-rolling

Ferracute Machine Co., Bridgeport, N. J.  
Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
Niagara Mch. & Tool Works, 637 Northland Ave., Buffalo, N. Y.  
Yoder Co., 5500 Walworth, Cleveland, Ohio

#### FORMING MACHINES, Multiple-slide

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio  
Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Clearing Machine Corp., 6499 W. 65 St., Chicago 38, Ill.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, Ill.  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
Nilson, A. H. Machine Co., Bridgeport, Conn.  
U. S. Tool Co., Inc., 255 North Main St., Amherst, N. J.



ESPEN-LUCAS  
PHILADELPHIA

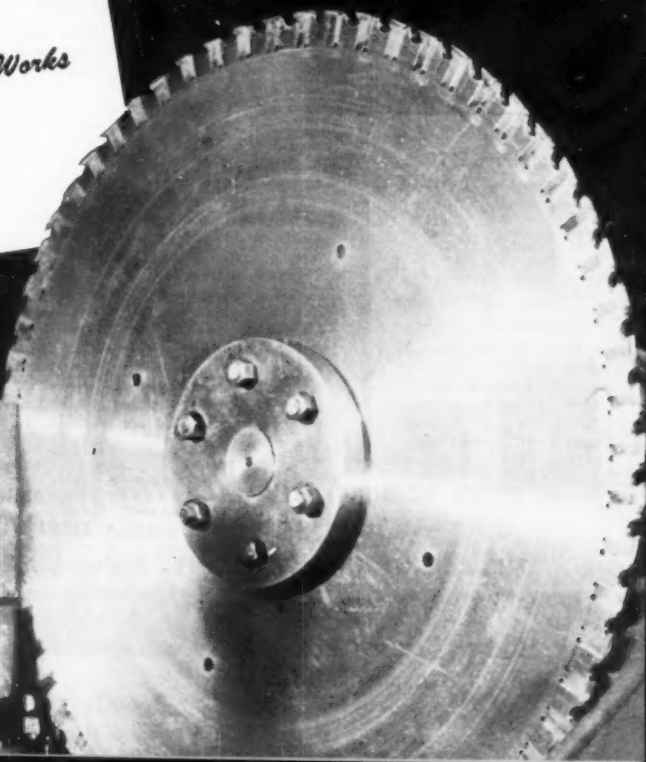
*Saves Time... Cuts Costs*

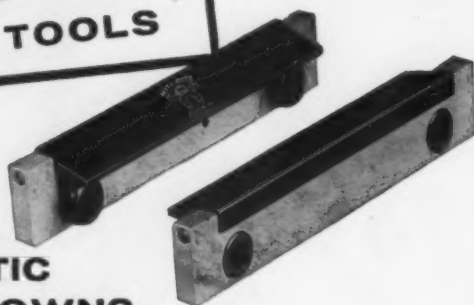
**Rotary Planer** . . . do milling jobs in one-third to one-seventh of time on an Espen-Lucas Rotary Planer.

**Big Sawing** . . . production cutting of large stock—rapid, easy, straight-to-a-line piece after piece—on Espen-Lucas Cold Sawing Machines.

*The* **ESPEN-LUCAS** *Machine Works*  
Front Street and Girard Ave., Phila. 23, Pa.

BUILDERS OF LARGE COLD SAWING MACHINES • ROTARY PLANERS • COLUMN FACERS  
• HEAVY TYPES OF SPECIAL MACHINERY





## MAGNETIC HOLD DOWNS

A new, time-saving idea in hold downs — faster, easier and more convenient. Attaches instantly and holds to vise jaws in any position without use of shims, blocks or parallels.

Clamping edge is 3/32", will hold very thin work. Backs are tapered, forcing the work downward as the vise jaws close. A flat spring tab keeps the hold down in a horizontal position until pressure is applied.



## MAGNETIC BASE HEAVY DUTY Surface Gage

A large, rugged surface gage and indicator holder. Increased base size prevents rocking... larger, stronger magnets permit use with lug back and other heavy indicators and attachments.

The two heavy duty magnets recessed into the solid aluminum base are completely isolated from the spindle and other parts to avoid transmission of the magnetic pull. Polarity of the magnets is controlled by a king size on-off switch that turns the magnetic pull to full on... full off... or to any intermediate point to make minor adjustments in position. Ground and lapped, contact face has a V-groove, adapting it for use on cylindrical surfaces.

New design scriber has a removable, long-wearing carbide tip which can be reversed to protect the tip from damage when not in use.

Rugged, rocker arm and large diameter fine adjustment screw permit final, precise adjustments. 9" and 12" spindles, swivel indicator attachment, indicator holding rod, and scriber with reversible carbide tip are included. 18" spindle also available.

### MITI-MITE MAGNETIC BASE TOOLS CATALOG



Send for this new 12 page illustrated catalog today. Contains full information on the complete Lufkin line of magnetic base tools.

BETTER MEASURE WITH **LUFKIN**

TAPES • RULES • PRECISION TOOLS

THE LUFKIN RULE COMPANY, Saginaw, Michigan

IT PAYS TO USE YOUR INDUSTRIAL DISTRIBUTOR  
... He offers emergency 24 hour service

316—MACHINERY, November, 1957

### FORMING TOOLS or Tool Blanks

Brown & Sharpe Mfg. Co., Providence, R. I.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York  
Kennametal, Inc., Latrobe, Pa.  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

### FURNITURE, Shop

Standard Pressed Steel Co., Jenkintown, Pa.

### GAGE BLOCKS

Brown & Sharpe Mfg. Co., Providence, R. I.  
Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.  
DoALL Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

### GAGES, Air Comparator

Federal Products Corp., 1144 Eddy St., Providence 1, R. I.  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Sheffield Corp., Box 893, Dayton 1, Ohio  
Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill.

### GAGES, Automatic Sorting

Federal Products Corp., 1144 Eddy St., Providence 1, R. I.

### GAGES, DIAL, Bore, Height, Depth, Thread, Groove, etc.

Ames. B. C., Co., Waltham 54, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Bryant Chucking Grinder Co., Clinton St., Springfield, Vt.  
Comtor Co., 47 Farwell St., Waltham 54, Mass.  
Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.  
DoALL Co., Des Plaines, Ill.  
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.  
Lufkin Rule Co., Saginaw, Mich.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill.  
Starrett, The L. S., Co., Athol, Mass.

### GAGES Electric Comparator

Brown & Sharpe Mfg. Co., Providence, R. I.  
DoALL Co., Des Plaines, Ill.  
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Sheffield Corp., Box 893, Dayton 1, Ohio  
Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill.

### GAGES, Grinding

Federal Products Corp., 1144 Eddy St., Providence 1, R. I.

### GAGES, Machinists' Hand, including Center, Cutter Clearance, Drill Point, Drill Size, Planer, Radius, Screw Pitch, Taper, Telescoping Thickness

Brown & Sharpe Mfg. Co., Providence, R. I.

### GAGES, Multiple Inspection

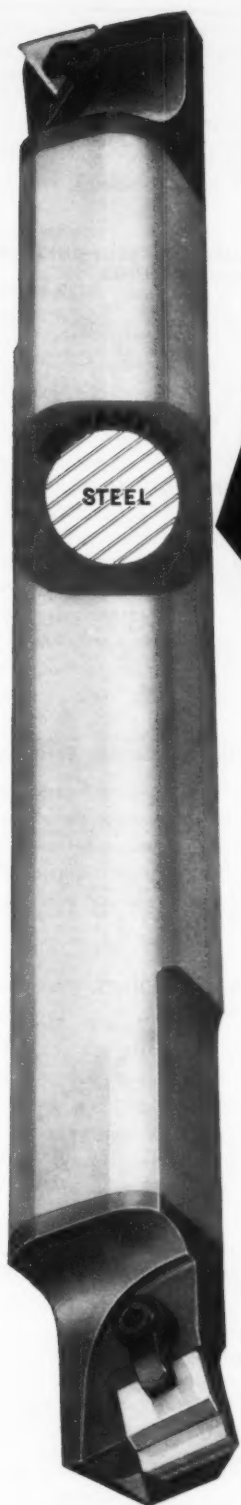
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Sheffield Corp., Box 893, Dayton 1, Ohio

### GAGES, Plug and Ring

Brown & Sharpe Mfg. Co., Providence, R. I.  
Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.  
DoALL Co., Des Plaines, Ill.

(Continued on page 318)





Jobs that "couldn't be done" before...

NOW easily handled with

The NEW **KENNAMETAL\***

**ENCASED**

**Kendex\* Boring Bars**

If you have been having boring-bar troubles, here are some experiences that will interest you:

... At one of the nation's largest steel mills, the shop was unable to complete the contour boring of even a single steel tube, because of extreme chatter of the steel boring bar. A Kennametal encased Kendex boring bar was substituted . . . and the chatter was completely eliminated.

... At another plant, holes were being bored with a steel boring bar equipped with pilot. The holes were roughed at 950 RPM with a 1-inch per minute feed, and finished at 2-inches feed. Tool life averaged ten holes per grind. The tool cost per piece averaged \$0.49 each for more than 4400 pieces over an 18-month period. Furthermore, at least 50% of the holes had to be reamed either to correct size or taper.

When a Kennametal encased Kendex boring bar was substituted, feeds

were almost doubled—to 2 inches per minute roughing and 3½ inches per minute finishing. Tool life has been increased to 70 holes per cutting edge on roughing, and 80 holes per edge on finishing, with a tool cost per piece of \$0.08. Holes are absolutely true to size and taper—the first time the shop had ever been able to hold dimensions with such consistency. It is anticipated that speeds and feeds can be substantially increased, which will effect further savings.

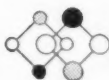
... A well-known equipment manufacturer is using a 1¾-inch Kennametal encased bar to bore cast steel at 350 feet per minute, .020-inch feed and approximately ½-inch depth of cut. The bar is used at full overhang—about 12 inches—and no chatter or bar deflection is experienced.

Kennametal Encased Kendex Boring Bars are available in a range of sizes. For information, write: KENNAMETAL INC., Latrobe, Pa.

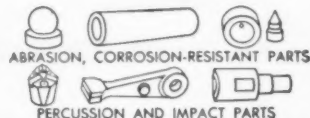
\*Trademark

C-3093

**DOUBLE-END TYPE**



INDUSTRY AND  
**KENNAMETAL**  
... *Partners in Progress*



Greenfield Tap & Die Corp., Greenfield, Mass.  
Hanson-Whitney Co., 169 Bartholomew Ave.,  
Hartford 3, Conn.  
Metallurgical Products Dept. of General Elec-  
tric Co., Box 237, Roosevelt Park Annex,  
Detroit 32, Mich.  
Pratt & Whitney Co., Inc., West Hartford,  
Conn.  
Scherr, George Co., Inc., 200 Lafayette St.,  
New York 12, N. Y.  
Sheffield Corp., Box 893, Dayton 1, Ohio  
Size Control Co., 2500 W. Washington Blvd.,  
Chicago 12, Ill.  
Threadwell Tap & Die Co., 16 Arch St., Green-  
field, Mass.  
Van Keuren Co., Watertown, Mass.  
Winter Bros. Co., Rochester, Mich.

#### GAGES, Pressure, Air and Hydraulic

Modern Industrial Eng. Co., 14230 Birwood  
Ave., Detroit 38, Mich.

#### GAGES, Roll Thread Snap, Adjustable Snap

Federal Products Corp., 1144 Eddy St., Provi-  
dence 1, R. I.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Sheffield Corp., Box 893, Dayton 1, Ohio  
Size Control Co., 2500 W. Washington Blvd.,  
Chicago 12, Ill.  
Standard Gage Co., Inc., Poughkeepsie, N. Y.  
Threadwell Tap & Die Co., 16 Arch St., Green-  
field, Mass.

#### GAGES, Surface Roughness

DoAll Co., Des Plaines, Ill.  
Sheffield Corp., Box 893, Dayton 1, Ohio

#### GAGES, VERNIER, Height, Depth, Gear Tooth

Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., Des Plaines, Ill.  
Federal Products Corp., 1144 Eddy St., Provi-  
dence 1, R. I.  
Starrett Co., L. S., Athol, Mass.

#### GASKETS

Garlock Packing Co., Palmyra, N. Y.

#### GEAR BURNISHERS

Fellows Gear Shaper Co., Springfield, Vt.  
Gleason Works, 1000 University Ave., Roches-  
ter 3, N. Y.  
Sheffield Corp., Box 893, Dayton 1, Ohio

#### GEAR CHAMFERING, ROUNDING AND DEBURRING MACHINES

Bilgram Gear & Mch. Works, 1217-35 Spring  
Garden St., Philadelphia, Pa.  
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
Gleason Works, 1000 University Ave., Roches-  
ter 3, N. Y.  
Modern Industrial Engrg. Co., 14230 Birwood,  
Detroit 4, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jer-  
sey City 2, N. J.  
Sheffield Corp., Box 893, Dayton 1, Ohio

#### GEAR CHECKING EQUIPMENT

Brown & Sharpe Mfg. Co., Providence, R. I.  
Fellows Gear Shaper Co., Springfield, Vt.  
Gleason Works, 1000 University Ave., Roches-  
ter 3, N. Y.  
Michigan Tool Co., 7171 E. McNichols Rd.,  
Detroit 12, Mich.  
National Broach & Mch. Co., 5600 St. Jean  
Ave., Detroit 2, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place,  
Jersey City 2, N. J.  
Russell, Holbrook & Henderson, Inc., 292 Mad-  
ison Ave., New York 17, N. Y.  
Scherr, George Co., Inc., 200 Lafayette St.,  
New York 12, N. Y.

#### GEAR CUTTING MACHINES Bevel and Spiral

Gleason Works, 1000 University Ave., Roches-  
ter 3, N. Y.  
Hanson-Whitney Co., 169 Bartholomew Ave.,  
Hartford 3, Conn.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jer-  
sey City 2, N. J.  
Scherr, George Co., Inc., 200 Lafayette St.,  
New York 12, N. Y.  
Seewald Inc., 1956 Woodbridge Ave., New  
Brunswick, N. J.

#### GEAR CUTTING MACHINES, Worm and Worm Wheels

Barber-Colman Co., 1300 Rock St., Rockford,  
Ill.  
Cone Drive Gear Div., 7171 E. McNichols Rd.,  
Detroit 12, Mich.  
Gleason Works, 1000 University Ave., Roches-  
ter 3, N. Y.  
New Jersey Gear & Mfg. Co., 1470 Chestnut  
Ave., Hillside, N. J.  
Orban Kurt Co., Inc., 42 Exchange Place, Jer-  
sey City 2, N. J.  
Russell, Holbrook & Henderson, Inc., 292 Mad-  
ison Ave., New York 17, N. Y.  
Scherr, George Co., Inc., 200 Lafayette St.,  
New York 12, N. Y.

#### GEAR GRINDERS—See Grinding Ma- chines, Gear

#### GEAR HOBBERS

American Schiess Corp., 1232 Penn Ave., Pitts-  
burgh 22, Pa.  
Barber-Colman Co., 1300 Rock St., Rockford,  
Ill.  
Coso Corp., 405 Lexington Ave., New York  
17, N. Y.  
Fellows Gear Shaper Co., Springfield, Vt.  
Hamilton Tool Co., 834 S. 9th St., Hamilton,  
Ohio  
Michigan Tool Co., 7171 E. McNichols Rd.,  
Detroit 12, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jer-  
sey City 2, N. J.  
Russell, Holbrook & Henderson, Inc., 292 Mad-  
ison Ave., New York 17, N. Y.

#### GEAR HONERS

National Broach & Mch. Co., 5600 St. Jean,  
Detroit 13, Mich.

## WHAT... NO UNIVERSAL DRILL BUSHINGS?

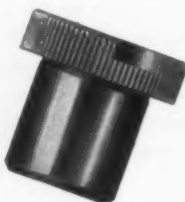


Wherever there are holes  
to drill using jigs or fixtures,  
it pays to specify Universal drill  
bushings. Machined from finest quality

steel, Universal bushings have super-finished bores which lengthen tool  
life and reduce bushing wear over long production runs.  
Knurled heads provide quick, sure grip. Blended  
radii on top-inside diameters help prevent tool hang-up  
and breakage. Standard sizes and lengths in  
stock for immediate delivery.



**FREE UNIVERSAL SELECTOR.** Gives all  
engineering data for selection of  
all types and sizes of drill bushings  
up to 1 3/4" drill size. Send request  
on your company letterhead.



**UNIVERSAL ENGINEERING CO.** FRANKENMUTH 2, MICHIGAN

**GEAR LAPPERS**

Fellows Gear Shaper Co., Springfield, Vt.  
Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
National Broach & Mch. Co., 5600 St. Jean, Detroit 12, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.

**GEAR MOTORS**—See Speed Reducers

**GEAR RACKS**

Gear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, Ill.  
Illinois Gear & Mch. Co., 2108 No. Natchez Ave., Chicago 35, Ill.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
Stahl Gear & Mch. Co., The, 3901 Hamilton Ave., Cleveland 4, Ohio

**GEAR SHAVERS**

Fellows Gear Shaper Co., Springfield, Vt.  
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

**GEAR SHAVERS**

Fellows Gear Shaper Co., Springfield, Vt.  
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.

**GEARS, AND GEAR BLANKS, Non-metallic**

Boston Gear Works, 14 Hayward St., Quincy 71, Mass.  
Cincinnati Gear Co., Wooster Pike and Mariemont Ave., Cincinnati, Ohio  
Diefendorf Gear Corp., Box 934, Syracuse, N. Y.  
Gear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, Ill.  
Greaves Machine Tool Co., 2011 Eastern Ave., Cincinnati, Ohio  
Illinois Gear & Mch. Co., 2108 No. Natchez Ave., Chicago 35, Ill.  
New Jersey Gear & Mfg. Co., Hillside, N. J.  
Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.  
Ryerson, Jos. T. & Son, Inc., 16th and Rockwell St., Chicago 8, Ill.  
Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 4, Ohio

**GEARS, Cut**

Automotive Gear Works, Inc., South 8th & O St., Richmond, Ind.  
Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.  
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
Boston Gear Works, 14 Hayward St., Quincy 71, Mass.  
Cincinnati Gear Co., Wooster Pike and Mariemont Ave., Cincinnati, Ohio  
Cone Drive Gear Div., 7171 E. McNichols Rd., Detroit 12, Mich.  
Diefendorf Gear Corp., Box 934, Syracuse, N. Y.  
Fairfield Mfg. Co., 2309 S. Earl Ave., Lafayette, Ind.  
Gear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, Ill.  
Greaves Machine Tool Co., 2011 Eastern Ave., Cincinnati, Ohio  
Horsburg & Scott Co., 5114 Hamilton, Cleveland, Ohio  
Illinois Gear & Mch. Co., 2100 No. Natchez Ave., Chicago 35, Ill.  
James, D. O., Gear Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
New Jersey Gear Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.  
Perkins Machine & Gear Co., W. Springfield, Mass.  
Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.  
Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 4, Ohio  
Verson Allsteel Press Co., 93rd St. & S. Kenwood Ave., Chicago, Ill.

**GENERATORS, Electric**

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Reliance Electric & Engrg. Co., 1200 Ivanhoe Rd., Cleveland 10, Ohio

**GRADUATING MACHINES**

Gorton, Geo., Mch. Co., 1321 Racine St., Racine, Wis.

**GREASES**—See Lubricating Oils and Greases

**GRINDERS, Bench, Floor and Snag**

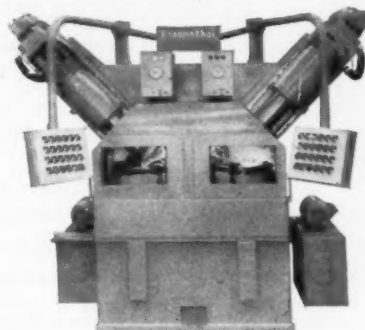
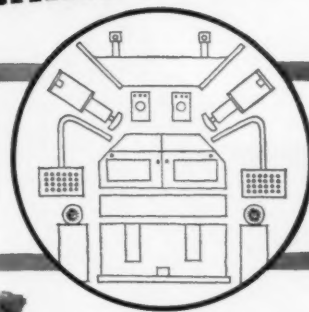
Delta Power Tool Div., 400 Lexington Ave., Pittsburgh, Pa.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Mummert-Dixon Co., Hanover, Pa.  
National Acme Co., 170 E. 131st St., Cleveland 8, Ohio  
South Bend Lathe Works, South Bend 22, Ind.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.  
U. S. Burke Machine Tool Div., Brotherton Rd., Cincinnati 27, Ohio

**GRINDERS, Carbide Tool**

Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass.  
Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh, Pa.  
Elox Corp. of Mich., Royal Oak 3, Mich.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
Le Maire Tool & Mfg. Co., Dearborn, Mich.  
Metallurgical Products Dept. of General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Oliver Instrument Co., 1410 E. Moume St., Adrian, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City, N. J.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio  
Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, Mich.

# **SIMPLE AS ABC...** the **STANDARD** **BUILDING BLOCK** **TECHNIQUE OF MACHINE DESIGN**

**FORD** wanted a machine to finish grind in excess of 100 impeller housings and 100 covers an hour. **Frauenthal Division—Kaydon** was given the job.



They put the machine together "building block" style... **AND SPECIFIED TWO STANDARD SUPER PRECISION SPINDLES.** The machine is working right now... turning out 138 pieces an hour on each side, at 80% efficiency.

Standard's new catalogues on Spindles, Slides and Feeds is a handbook of special machine components... with complete working drawings, dimensions and capacities. **WRITE FOR YOURS TODAY!**

America's most complete line of super precision spindles; also slides, feeds and tables. Spindles—motor driven and independent drive— $\frac{1}{4}$  H.P. to 200 H.P.

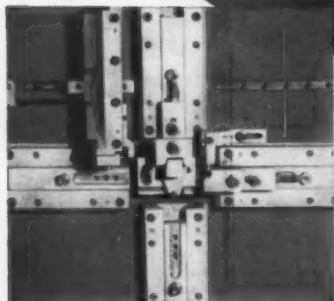
**SUPER PRECISION SPINDLE DIVISION**  
 SINCE 1912  
 the **STANDARD** electrical tool co.  
**STANDARD SETS THE PACE!**

2500 RIVER ROAD • CINCINNATI 4, • OHIO

**Booth 1641**  
**Metal Show**  
**Chicago**  
**Nov. 4-8**

# NEWEST

## CONCEPT IN FORMING

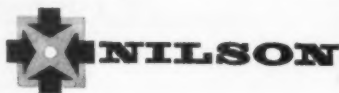


### MACHINE SPECIFICATIONS #V-187

- Max. diam. wire— inches ..... 1.87
- Max. length of feed—standard 15"
- Max. length of feed—with change gears ..... 30"
- Max. width ribbon metal ..... 1 1/4"
- Stroke of forming slides ..... 2 1/2"
- HP. required ..... 2
- Machine speed—standard 30-120 RPM
- 4 and 20 ton Press Attachments available.

Write To Our New Plant For VERTIFORM CATALOG

**THE A. H. NILSON MACHINE CO.** Bridgeport Ave., Shelton, Conn.



**Our LATEST DEVELOPMENT—**  
Applying 4-Slide Forming Techniques To A Vertical Machine.

Designed For Rapid Tooling Set-Up And Ease Of Operation.

### ADVANTAGES OF THE NILSON VERTIFORM

1. Greater Tool Accessibility
2. Unobstructed View Of Product Being Formed
3. Forming Slide Units Removable and Interchangeable
4. Less Floor Space Required
5. Operator Safety (Most Moving Parts Enclosed)
6. Automatic Oiling Of Entire Machine

### GRINDERS, Die and Mold

Norton Co., 1 New Bond St., Worcester 6, Mass.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio

### GRINDERS, Drill Point

Atlas Press Co., 20108 N. Pitcher, Kalamazoo, Mich.  
Consolidated Mch. Tool Div., 565 Blossom Rd., Rochester 10, N. Y.  
Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Standard Electrical Tool Co., 2500 River Rd., Cincinnati 4, Ohio

### GRINDERS, Face Mill

Kearney & Trecker Corp., Milwaukee 14, Wis.  
Mattison Machine Works, 545 Blackhawk Park Ave., Rockford, Ill.  
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

### GRINDERS, Knife and Shear

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
Mattison Machine Works, Rockford, Ill.  
Mummert-Dixon Co., Hanover, Pa.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio

### GRINDERS, Portable Electric

Chicago Pneumatic Tool Co., New York 17, N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Standard Electrical Tool Co., 2488-90 River, Cincinnati 4, Ohio  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

### GRINDERS, Portable Pneumatic

Chicago Pneumatic Tool Co., New York 17, N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Madison-Kipp Corp., Madison, Wis.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

### GRINDERS, Tap

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.

### GRINDERS, Tool and Cutter

Atlas Press Co., 20108 N. Pitcher, Kalamazoo, Mich.  
Barber-Colman Co., Rock and Montague, Rockford, Ill.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling and Grinding Mchs., Cincinnati 9, Ohio  
Coca Corp., 405 Lexington Ave., New York 17, N. Y.  
Delta Power Tool Div., 400 Lexington Ave., Pittsburgh, Pa.  
Elax Corp. of Mich., Royal Oak 3, Mich.  
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
Gallmeier & Livingston Co., 336 Straight Ave., S. W., Grand Rapids 4, Mich.  
Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
Gorton, Geo., Mch. Co., 1321 Racine St., Racine, Wis.  
Hamco Machines, Inc., 93 Mt. Hope Ave., Rochester 20, N. Y.  
Homestrand, Inc., Larchmont, N. Y.  
Landis Tool Co., Waynesboro, Pa.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Mummert-Dixon Co., Hanover, Pa.  
National Acme Co., 170 E. 131st St., Cleveland 8, Ohio  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
South Bend Lathe Wks., South Bend 22, Ind.  
Thompson Grinder Co., 1500 W. Main St., Springfield, Ohio





**P L A N N E D**

**P R E C I S I O N**

In a bearing, **PLANNED PRECISION** is the carefully evaluated incorporation of whatever precision features are necessary to provide for the functional requirements of the job—not more, not less. Precision refinements are costly, and should be selected with care to insure products that are both economically and functionally correct.

In the **NICE LINE**, Product Designers will find a complete range of ball bearings incorporating varying degrees of precision. **NICE** catalog standard bearings are available in precision, semi-precision and unground types. If a specially designed bearing is the correct answer to the application problem, **NICE** engineers are qualified and capable "Specialists in Specials".

Write for Catalog No. 190

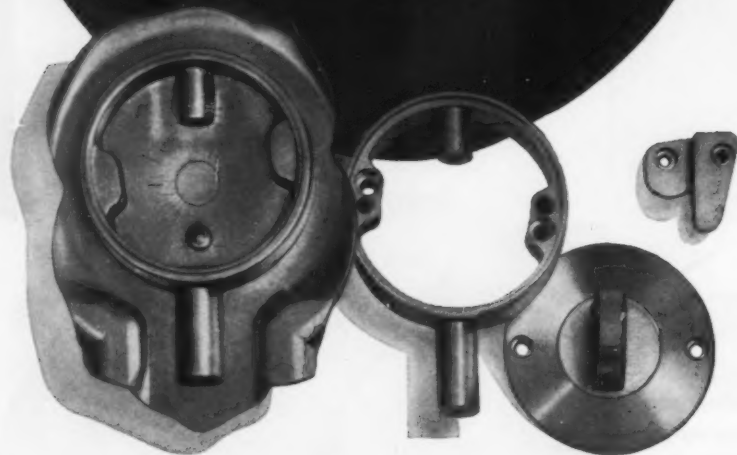


**NICE** is the word for **BEARINGS**

**NICE BALL BEARING COMPANY**  
NICETOWN · PHILADELPHIA · PENNSYLVANIA

# AMES

*...the preferred  
Dial Indicators...*



have forged cases, backs and wheel supports  
for maximum stability

Accurate measurements depend on the complete absence of interfering factors. That's why Ames Dial Indicators have forged cases, backs and wheel supports for maximum dimensional stability. The extreme care put into the design and material selection of component parts typifies the Ames approach to manufacturing a superlative product. It's just one of the reasons why the lifetime cost of Ames Dial Indicators is lower, and why so many quality control engineers specify Ames as "preferred". Write today for complete information.

*Representatives in principal cities*



## B.C. AMES CO.

27 Ames Street, Waltham 54, Mass.

MANUFACTURERS OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

### GRINDERS, Toolpost

Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio

### GRINDING GAGES—See Gages, Grinding

### GRINDING MACHINES, Abrasive Belt

Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
Mattison Mch. Works, Rockford, Ill.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.  
Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

### GRINDING MACHINES, Broach

Colonial Broach & Machine Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.  
Gallmeyer & Livingston Co., 336 Straight, S. W., Grand Rapids 2, Mich.  
Lapointe Mch. Tool Co., 34 Tower St., Hudson, Mass.  
National Broach & Mch. Co., 5600 St. Jean, Detroit 13, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Thompson Grinder, 1534 W. Main, Springfield, Ohio

### GRINDING MACHINES, Cam

Landis Tool Co., Waynesboro, Pa.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Van Norman Mch. Co., 3640 Main St., Springfield 7, Mass.

### GRINDING MACHINES, Centerless

Bryant Chucking Grinder Co., Clinton St., Springfield, Vt.  
Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
Landis Tool Co., Waynesboro, Pa.  
Triplex Machine Tool Corp., 75 West St., New York 6, N. Y.  
Van Norman Mch. Co., Springfield, Mass.

### GRINDING MACHINES, Crankshaft

Landis Tool Co., Waynesboro, Pa.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Van Norman Mch. Co., Springfield, Mass.

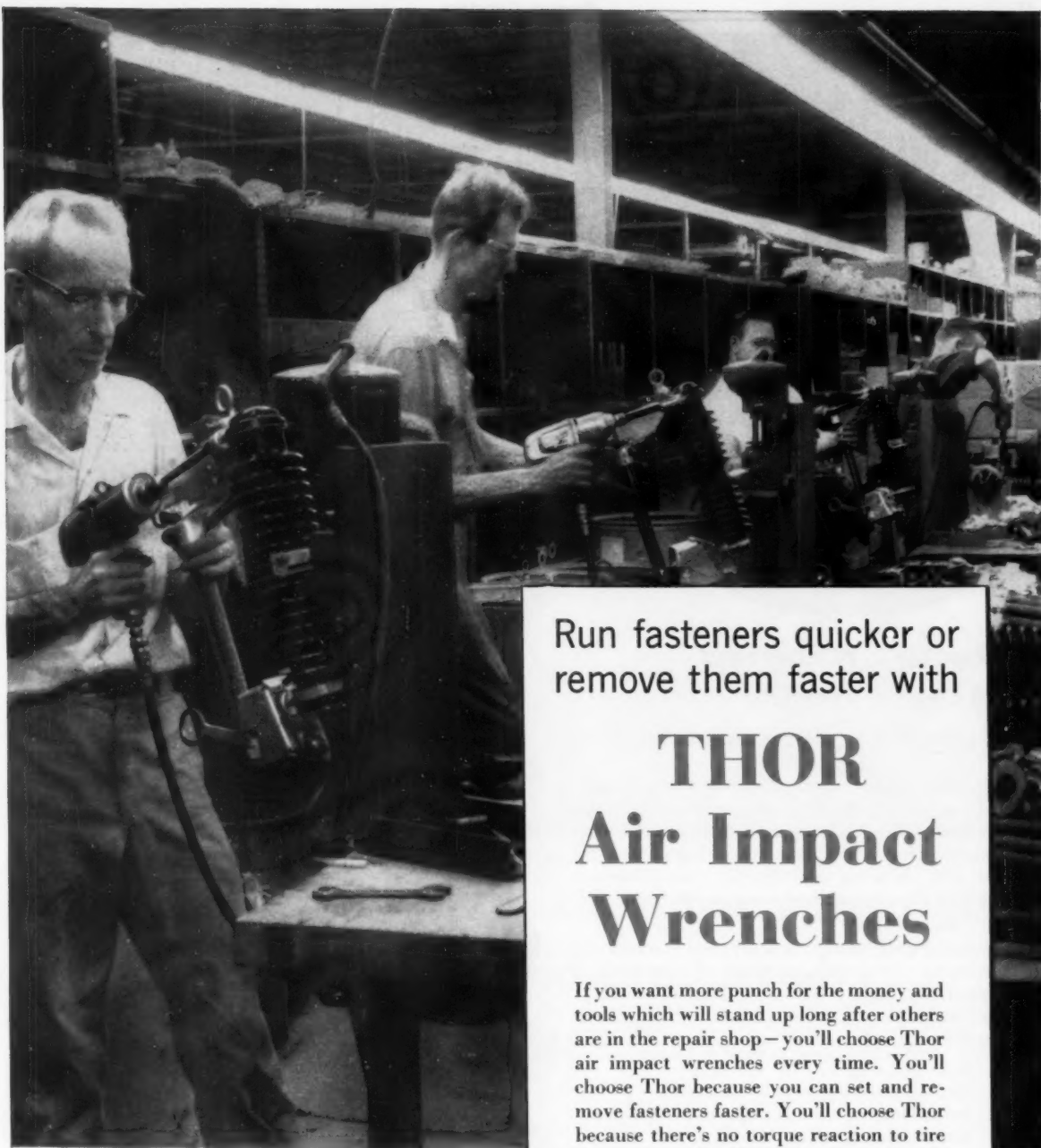
### GRINDING MACHINES, Cylindrical

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Frauenthal Div., Muskegon, Mich.  
Gallmeyer & Livingston Co., 336 Straight, S. W., Grand Rapids 2, Mich.  
Landis Tool Co., Inc., Waynesboro, Pa.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Sheffield Corp., Box 893, Dayton 1, Ohio  
Standard Electrical Tool Co., 2500 River Rd., Cincinnati 4, Ohio  
Van Norman Co., 2640 Main St., Springfield 7, Mass.

### GRINDING MACHINES, Disc

Brown & Sharpe Mfg. Co., Providence, R. I.  
Delta Power Tools Div., 400 Lexington Ave., Pittsburgh 8, Pa.  
Gardner Machine Co., Beloit, Wis.

(Continued on page 324)



Run fasteners quicker or  
remove them faster with

## THOR Air Impact Wrenches

If you want more punch for the money and tools which will stand up long after others are in the repair shop—you'll choose Thor air impact wrenches every time. You'll choose Thor because you can set and remove fasteners faster. You'll choose Thor because there's no torque reaction to tire the operator. The Thor impact wrenches do the work—not the operator. And Thor gives you the widest selection of tools— $\frac{1}{4}$ " to  $1\frac{1}{4}$ " bolt capacities—a variety of angle attachments and accessories.

Get Thor impact wrenches on the job today—watch your costs go down tomorrow. Call your Thor factory representative for a demonstration. Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

**THOR POWER TOOL COMPANY**  
CHICAGO

Atlanta • Birmingham  
Boston • Buffalo  
Chicago • Cincinnati  
Cleveland • Denver  
Detroit • Houston  
Indianapolis • Kansas City, Mo.  
Los Angeles • Milwaukee  
Newark • Long Island City,  
N.Y. • Philadelphia  
Pittsburgh • Richmond  
St. Louis • San Francisco  
Seattle • Toronto, Canada  
Export Division, New York City



**Gears with long useful lives ...  
the result of *high quality*\* at H&S**



- \* Quality materials**
- \* Modern tooling**
- \* Superior workmanship**

Highly appreciated by the paper mill industry, for instance, are the large spur gears such as the one shown here. This gear has 140 teeth of 2 diametral pitch and 8" face. It is being completed on a 100" Fellows Gear Shaper that generates high quality external and internal spur gears up to 8" face and 1½ D.P.

The modern Horsburgh & Scott plant is equipped with many new precision tools to meet today's demand for higher quality industrial gearing. You can judge our ability to serve you by these examples of size range:

- Spur gears up to 156" diameter
- Helical gears up to 100" diameter
- Sykes Herringbone gears up to 60" diameter
- Bevel gears up to 77" diameter
- Worm gears up to 60" diameter

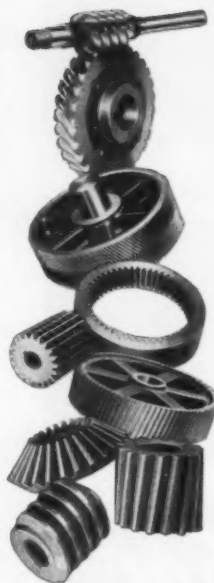
You benefit by the exacting care that we exercise in every manufacturing step. Tell us your requirements; quotations will be sent by return mail.

A request on your company letterhead will bring a copy of the new H&S Gear Catalog 57 to help you design and order industrial gears.

## THE HORSBURGH & SCOTT CO.

**GEARS AND SPEED REDUCERS**

5112 Hamilton Avenue  
Cleveland 14, Ohio



Mattison Machine Works, Rockford, Ill.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio

### GRINDING MACHINES, Gear

Cosco Corp., 405 Lexington Ave., New York 17, N. Y.  
Gear Grinding Mch. Co., 3901 Christopher St., Detroit 11, Mich.  
Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
Lees-Bradner Co., Cleveland, Ohio  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
Sheffield Corp., Box 893, Dayton 1, Ohio

### GRINDING MACHINES, Internal

Aaron Machinery Co., Inc., 45 Crosby St., New York 1, N. Y.  
Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass.  
Bryant Chucking Grinder Co., Clinton St., Springfield, Vt.  
Cosco Corp., 405 Lexington Ave., New York 17, N. Y.  
Frauenthal Div., Muskegon, Mich.  
Gallmeyer & Livingston Co., 336 Straight, S.W., Grand Rapids 2, Mich.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio  
Van Norman Mch. Co., Springfield, Mass.  
Wicaco Machine Corp., Wayne Junction, Philadelphia, Pa.

### GRINDING MACHINES, Jig

Fosdick Mch. Tool Co., 1638 Blue Rock St., Cincinnati 23, Ohio  
Gallmeyer & Livingston Co., 336 Straight, S.W., Grand Rapids 2, Mich.  
Moore Special Tool Co., Inc., 740 Union Ave., Bridgeport, Conn.

### GRINDING MACHINES, Profile

Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Cosco Corp., 405 Lexington Ave., New York 17, N. Y.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Sheffield Corp., Box 893, Dayton 1, Ohio

### GRINDING MACHINES, Roll

Landis Tool Co., Waynesboro, Pa.

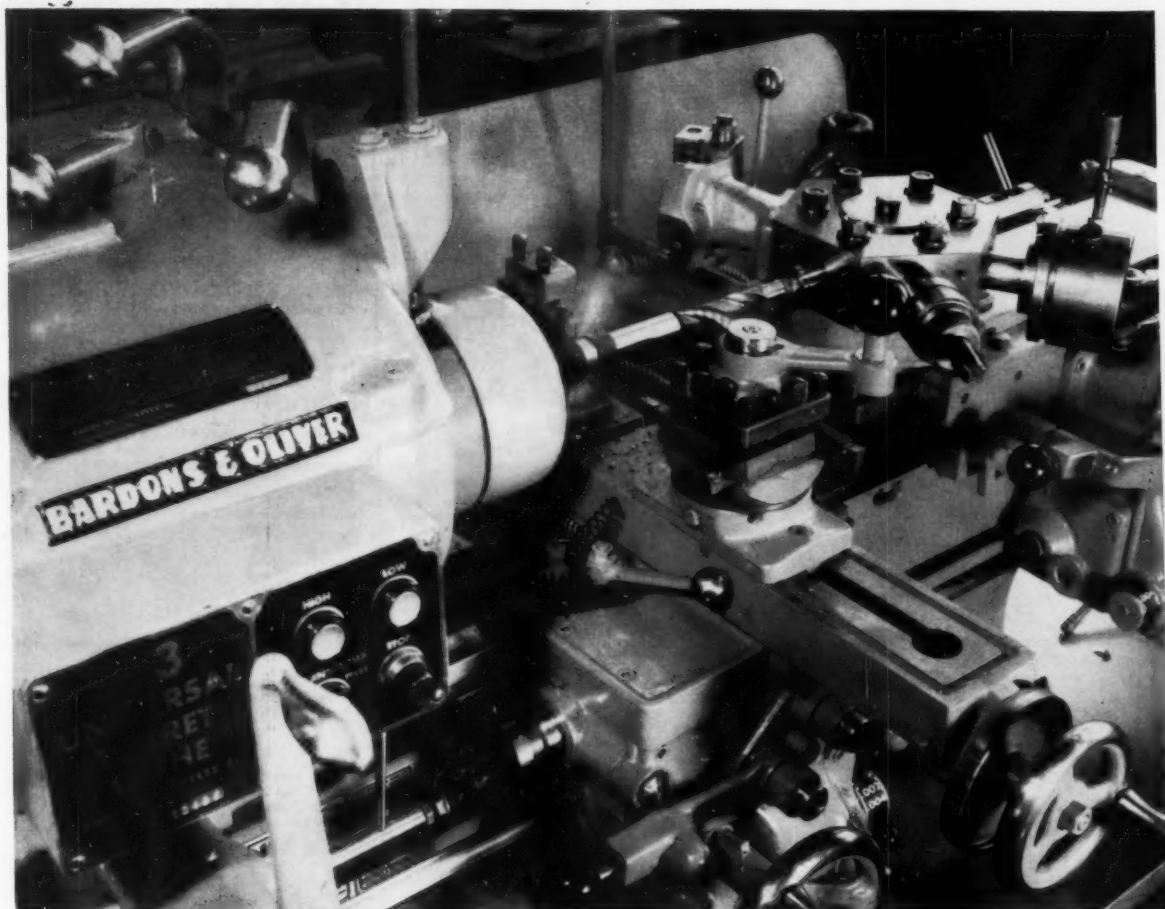
### GRINDING MACHINES, Surface Reciprocating

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Delta Power Tool Div., 400 Lexington Ave., Pittsburgh, Pa.  
DoAll Co., Des Plaines, Ill.  
Elox Corp. of Mich., Royal Oak 3, Mich.  
Foote-Burt Co., 13000 St. Clair Ave., Cleveland 8, Ohio  
Gallmeyer & Livingston Co., 336 Straight Ave., S. W., Grand Rapids 4, Mich.  
Gardner Machine Co., Beloit, Wis.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
Homestrand, Inc., Larchmont, N. Y.  
Mattison Machine Works, Rockford, Ill.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Thompson Grinder Co., 1500 W. Main St., Springfield, Ohio  
Van Norman Mch. Co., Springfield, Mass.

### GRINDING MACHINES, Surface Rotary

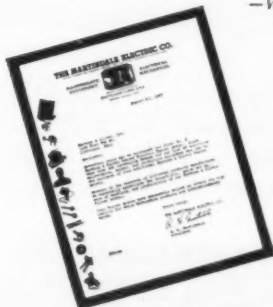
Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass. (Rotary)





**"We especially appreciate the versatility,  
quick set-up and productivity  
of BARDONS & OLIVER Turret Lathes"**

*—Writes Mr. R. H. Martindale, President of Martindale Electric Co., Cleveland, Ohio*



This firm, manufacturing an internationally known line of electrical maintenance, safety and production equipment, purchased their first Bardons & Oliver Turret Lathe seventeen years ago. Since then four additional Bardons & Oliver machines have been added to their modern production facilities.

Bardons & Oliver is proud of their hundreds of "old" Customers. Repeat orders mean one thing — satisfied customers.

**Manufacturers of a complete line of  
Turret Lathes and Cutting-off Lathes**

**BARDONS & OLIVER, INC.**

1135 WEST 9TH STREET

• CLEVELAND 13, OHIO

# You buy Scully-Jones

## "PREMIUM FEATURE"

### FLOATING HOLDERS

### AT NO PREMIUM IN PRICE!

| These benefits . . .            | for these reasons . . .   | result from these PREMIUM features   |
|---------------------------------|---|--|
| <b>HIGHER QUALITY WORK</b>      | No "binding" or dead spots to cause ball-mouthed, out-of-round, improperly finished reamed holes. No excessive or tapered threads when tapping. | 1. Exclusive double-gear spline drive provides a balanced, constant velocity, and a flexible drive coupling which permits freedom of lateral or angular movement.  |
| <b>LOWER CUTTING TOOL COSTS</b> | No "cramping" to break the cutting edges.   | 2. Two thrust bearings placed close together and independent of drive, as well as proper clearance in the spline, allow tool to float freely and quickly into proper alignment.  |
| <b>INCREASED PRODUCTION</b>     | Less downtime due to cutting tool breakage.   | 3. New Lock-and-Eject Type Check (Style "JT") eliminates need for conventional-type drill.   |
| <b>LOWER MAINTENANCE COSTS</b>  | Positive, self-lubricating action practically eliminates wear.  | 4. "Rocking" action with spline drive coupling causes continuous flow of lubricant in and out of splines, and cushions drive against torsional shock and overload. Shell houses floating and driving elements, and acts as perfect seal for lubricant. |
| <b>LOWER TOOLING COSTS</b>      | Holder may be used for most close-center and multiple-spindle operations.   | 5. Small body diameter.  |
|                                 | Requires little space between spindle and work.   | 6. Minimum body projection (Style "JT" and "JS").  |

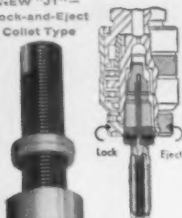
**SCULLY JONES**

Call your Scully-Jones factory-trained representative or distributor for complete information and prices.

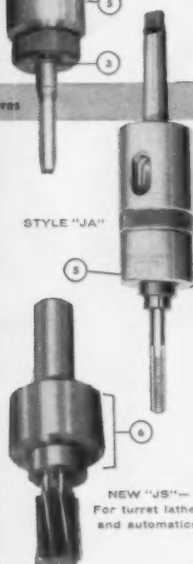
**PRECISION HOLDING TOOLS**  
"Precision Holding" for holding precision

Scully-Jones and Company, 1906 South Rockwell Street, Chicago 8, Illinois

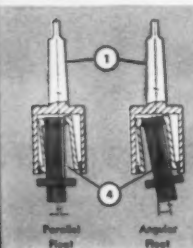
NEW "JT"—  
Lock-and-Eject  
Collet Type



STYLE "JA"



NEW "JS"—  
For turret lathes  
and automatics



Blanchard Machine Co., 64 State St., Cambridge, Mass.  
Gardner Machine Co., Beloit, Wis.  
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
Mattison Machine Works, Rockford, Ill.  
National Acme Co., 170 E. 131st St., Cleveland 8, Ohio  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Thompson Grinder Co., 1500 W. Main St., Springfield, Ohio  
Van Norman Mch. Co., Springfield, Mass.  
Walker, O. S., Co., Inc., Worcester, Mass.

## GRINDING MACHINES, Thread

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 17, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 32, Mich.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Landis Machine Co. (Centerless), Waynesboro, Pa.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Sheffield Corp., Box 893, Dayton 1, Ohio

## GRINDING MACHINES, Universal

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Frauenthal Div., Muskegon, Mich.  
Gallmeyer & Livingston Co., 336 Straight, S.W., Grand Rapids 2, Mich.  
Gorton Mch. Co., Geo., 1321 Racine St., Racine, Wis.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Landis Tool Co., Waynesboro, Pa.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Parker-Majestic, Inc., 147 Joseph Campau, Detroit, Mich.  
Springfield Mch. Tool Co., 613 W. Southern Ave., Springfield, Ohio

## GRINDING WHEEL DRESSING AND FORMING DEVICES

DoAll Co., Des Plaines, Ill.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Metal Carbides Corp., Youngstown, Ohio  
Moore Special Tool Co., Inc., 740 Union Ave., Bridgeport 7, Conn.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Sheffield Corp., Box 893, Dayton 1, Ohio

## GRINDING WHEELS

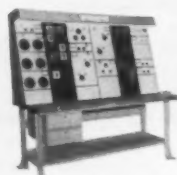
Blanchard Machine Co., 64 State St., Cambridge, Mass.  
Cincinnati Milling and Grinding Mchs., Inc., Cincinnati 9, Ohio  
Cincinnati Milling Products Div., Cincinnati 9, Ohio  
Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Gardner Machine Co., Beloit, Wis.  
Mackin Co., Jackson, Michigan  
Metal Carbides Corp., Youngstown, Ohio  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Simonds Abrasive Co., Tacony and Fraley St., Bridgeburg, Philadelphia, Pa.

## GROOVING TOOLS, Internal

Kennametal Inc., Latrobe, Penna.  
Scully-Jones & Co., 1906 So. Rockwell St., Chicago 8, Ill.  
Waldes Kahinor, Inc., 47-16 Austel Place, Long Island City 1, N. Y.  
Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, Mich.

**HAMMERS, Drop**—See Forging Hammers

## For profit-minded tool buyers!



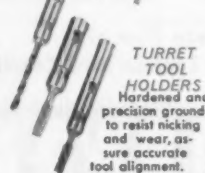
**"TOOLITROL" BOARDS**  
Take the human element out of multiple-spindle operations, help control quality and production.



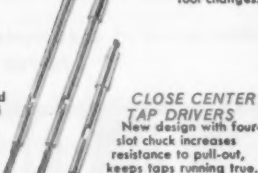
**NEW TENSION AND COMPRESSION TAP HOLDERS**  
Lock-and-eject chuck speeds tool changes, increases holding power.



**PRESETTING TOOLS**  
Reduce setup time, downtime, and inspection time by as much as 50 percent.



**TURRET TOOL HOLDERS**  
Hardened and precision ground to resist nicking and wear, assure accurate tool alignment.



**CLOSE CENTER TAP DRIVERS**  
New design with four-slot chuck increases resistance to pull-out, keeps taps running true.

## AUTOMOBILE TORSION BAR ANCHOR HOUSINGS

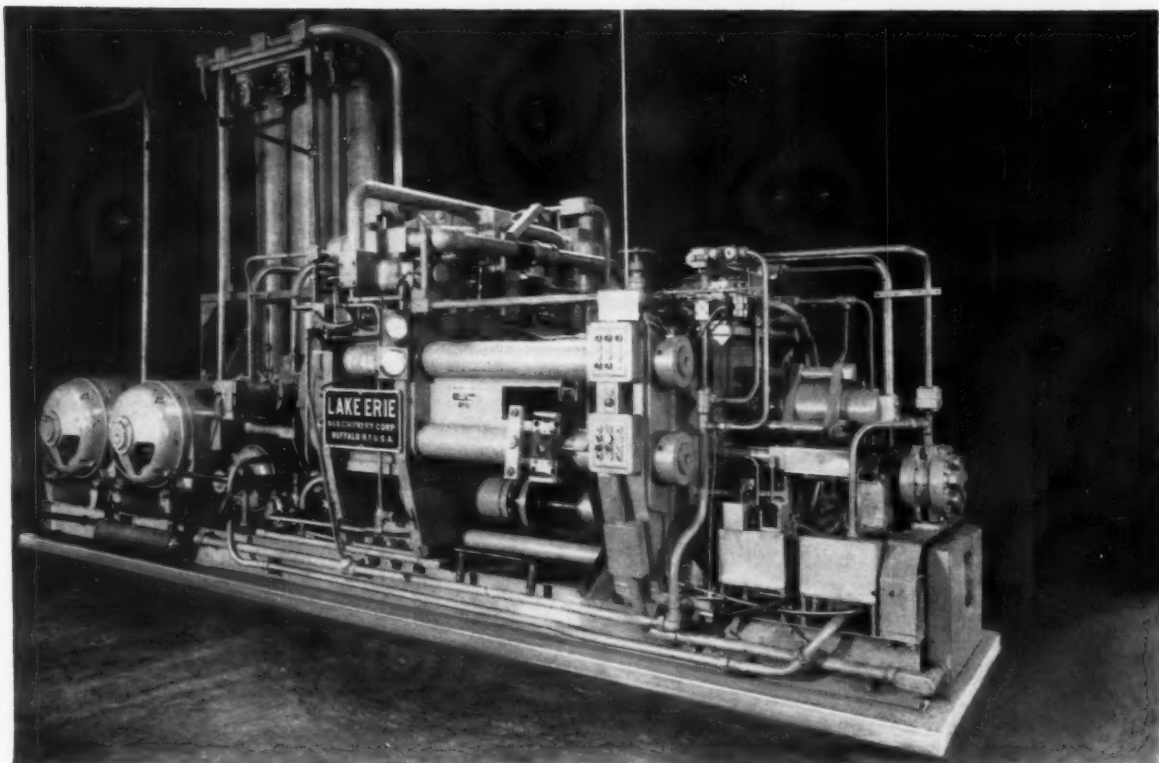
# Automatically cold extruded

FROM  
1035  
STEEL



## at a rate of 525/HR\*

\*Approximately 3 times screw machine production rate



- 40% of material saved
- Concentricity held to .010" total indicator reading
- Machining and labor costs greatly reduced
- Cold working eliminates heat treatment
- Physicals of finished piece improved

An experienced Lake Erie engineer will be glad to discuss material-saving, labor-saving, money-saving cold extrusion with you. He's as close as your phone.

**PRESS AND  
TOOLING BY  
LAKE ERIE**

**LAKE ERIE  
HYDRAULIC  
PRESSES**

LAKE ERIE MACHINERY CORPORATION, successor to  
**LAKE ERIE ENGINEERING CORPORATION**

476 Woodward Avenue, Buffalo 17, New York

DISTRICT OFFICES IN NEW YORK, CHICAGO, DETROIT

*Manufacturers of the Most Complete Line of Hydraulic Presses for All Industry*

MACHINERY, November, 1957—327

# How do you judge power chuck values?



**Buck POWER CHUCK**  
Hardened Key Ways  
Standard Feature

A Buck *plus* at no extra cost. Combined with hardened top jaws (made practical by the Buck for all operations) you can run thousands more pieces than with conventional chucks. Chuck sizes are: 6½", 8¼", 10", 12"—made with 2 or 3 jaws.

Send for a new  
Catalog today

## By Accuracy?

.001" is *guaranteed* with this chuck — on new runs and re-runs, *without re-truing jaws*.

## By Pieces Per Day?

You can make drastic cuts in down-time with the Buck. Top jaws can be machined in the tool room — hardened — and fitted in *minutes*. Final accuracy adjustment is made under actual operating conditions *with full air pressure*.

## By Chuck Life?

Hardened key ways greatly prolong production service. The Adjust-Tru principle helps compensate for wear.

## By Price?

You get all these extra Buck features at *conventional power chuck prices*.

The patented Buck Adjust-Tru principle makes such unusual performance possible. Write for full details today. *You can't beat bucking with a Buck.*

## BUCK TOOL COMPANY

1120 SCHIPPERS LANE • KALAMAZOO, MICHIGAN

WILSON "ROCKWELL" —  
THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

WILSON "ROCKWELL"

HARDNESS TESTERS



See the complete WILSON line  
at BOOTH No. 953

**39<sup>th</sup> National Metal Exposition**

NOVEMBER 4-8, 1957

International Amphitheatre  
CHICAGO, ILLINOIS

ACCO

**WILSON**

MECHANICAL INSTRUMENT DIVISION  
AMERICAN CHAIN & CABLE

230-D Park Avenue, New York 17, N.Y.

A FULL WILSON LINE  
TO MEET EVERY  
HARDNESS  
TESTING REQUIREMENT  
FULLY  
AUTOMATIC  
SEMI-AUTOMATIC  
REGULAR  
SPECIAL  
SUPERFICIAL  
MICRO & MACRO  
HARDNESS TESTERS



Write for  
booklet  
DH-325 today

## HAMMERS, Portable Electric

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

## HAMMERS, Portable Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

## HAMMERS, Power

Chambersburg Engrg. Co., Chambersburg, Pa.  
Edlund Mchry. Co. Div., Cortland, N. Y.  
Yoder Co., 5504 Walworth Ave., Cleveland 2, Ohio

## HARDENING FURNACES

Holcraft & Co., 6545 Epworth Blvd., Detroit 10, Mich.

## HARDNESS TESTERS

Shore Instrument & Mfg. Co., 90-35C Van Wyck Exp., Jamaica 35, N. Y.  
Wilson Mechanical Instrument Co., Inc., 230-D Park Ave., New York, N. Y.

**HEAT-TREATING EQUIPMENT**—See Annealing Furnaces, Flame Hardening Machines, Induction-heating Equipment

## HOBS

Barber-Colman Co., Rock and Montague, Rockford, Ill.  
Hanson-Whitney Co., 169 Bartholomew Ave., Hartford 3, Conn.  
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
National Twist Drill & Tool Co., Rochester, Mich.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
Star Cutter Co., 34500 Grand River, Farmington, Mich.

## HOISTS, Air

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

## HOISTS, Electric

Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

## HONING MACHINES

Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.  
Moline Tool Co., 102-20th St., Moline, Ill.  
Van Norman Mch. Co., 3640 Main St., Springfield 7, Mass.

## HONING STONES

Barnes Drill Co., 814 Chestnut St., Rockford, Ill.  
Norton Co., 1 New Bond St., Worcester 6, Mass.

## HOSE

American Metal Hose Br. American Brass Co., 25 Broadway, New York, N. Y.  
Schrader's Son, A., 470 Vanderbilt Ave., Brooklyn 38, N. Y.

## HYDRAULIC MACHINERY

**Tools and equipment**  
Baldwin-Lima-Hamilton Corp., Eddystone Div., Philadelphia 42, Pa.  
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.  
Bethlehem Steel Corp., Bethlehem, Pa.  
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.

(Continued on page 330)



YOU GET *SPEED*  
PLUS ACCURACY

WITH MOORE JIG GRINDERS



**HOLES from 1/64" to 8" Relocated and Ground within .0001" in One-Third Previous Time**

Before hardening, this two-station die block was Moore-Jig-Bored to eliminate the need for excessive grinding. After hardening and surface grinding, all holes were Moore-Jig-Ground to exact size and location. Blank hole and center piercing hole were ground with 1/2° included taper. Little clearance could be allowed between punch and die. Jig grinding time: *only 2 3/4 hours.*



**CONTOURS, Too, Accurately Jig Ground and Checked in One Setting**

This flanged punch, impractical to grind by any other method, was a natural for the No. 2 Moore Jig Grinder. All radii—male and female—were ground accurately to location and size. The piece, having been set up on a rotary table, was aligned to permit grinding of the angular surfaces. And the entire contour was inspected by the "indicator measuring" method while the punch was still on the machine.

**"HOLES, CONTOURS AND SURFACES**

is bound to become a classic to the man or shop that does accurate work."

*American Machinist Book Review*

424 pages—\$5 U.S.A., \$6 elsewhere

The word "versatile" must have been coined for the No. 2 Moore Jig Grinder. Not only does this machine relocate and grind straight and tapered holes with ease, but it contour grinds, chop grinds and slot grinds just as skillfully.

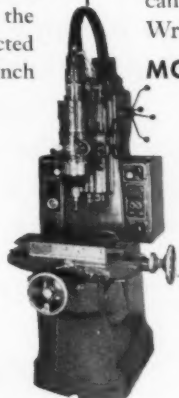
The Moore Jig Grinder, together with its tool-room teammate, the Moore Jig Borer, enables tool and die sections to be produced concurrently, puts diemaking on an interchangeable-parts-and-assembly basis. And it's also a time-saver on production jobs.

Employing the accurate lead screw measuring principle and a convenient system of coordinate hole location, the fast and sure Moore Jig Grinder eliminates hours of checking on bench and surface plate.

Why not find out how this remarkable machine can save *you* sizeable chunks of time and money. Write today for our detailed bulletin.


**MOORE SPECIAL TOOL COMPANY, INC.**

734 Union Ave., Bridgeport 7, Conn.



**NO. 2 MOORE JIG GRINDER**

Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up and down; spindle-housing heat control. Features slot grinding attachment.

**ADD  TO YOUR TOOLROOM**

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

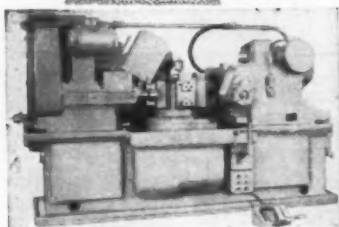
For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—329



## GOSS and DE LEEUW

### AUTOMATIC CHUCKING MACHINE



*means a complete piece...  
at each index cycle*

When a piece is finished it is completely finished without the necessity of a second operation. Furthermore it means more finished pieces in a given period of time and greater accuracy in every finished piece.

The "1-2-3" Method is exclusive with Goss & DeLeeuw. With it, three ends of a piece can be machined at a single chucking of the work, simultaneously or in sequence depending on the operations involved. It will pay you to investigate.



Send for illustrated literature giving detailed information. Send samples and ask us to give you cost estimates of handling this work on a "1-2-3" Goss & DeLeeuw Automatic Chucking Machine

## GOSS and DE LEEUW

MACHINE COMPANY, KENSINGTON, CONN., U.S.A.



Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Colonial Broach & Machine Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio.  
Erie Foundry Co., Erie, Pa.  
Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill.  
Hanson-Whitney Co., 169 Bartholomew Ave., Hartford 3, Conn.  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.  
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
Michigan Drill Head Co., Detroit 34, Mich.  
Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
Mott & Merryweather Machinery Co., Penton Bldg., Cleveland, Ohio.  
Oilgear Co., 1569 W. Pierce St., Milwaukee, Wis.  
Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
Verson Alsteel Press Co., 93rd St. & S. Kenwood Ave., Chicago, Ill.  
Vickers Incorporated, Div. of Sperry Rand Corp., 1402 Oakman Blvd., Detroit, Mich.  
Watson-Stilman Co., Roselle, N. J.  
Wilson, K. R., Inc., 211 Mill St., Arcade, N. Y.

#### HYDRAULIC POWER UNITS OR TOOL HEADS

Barnes Drill Co., 814 Chestnut, Rockford 3, Ill.  
Barnes, W. F. & John Co., 201 S. Waterford St., Rockford, Ill.  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford 12, Conn.  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.  
Le Maire Tool & Mfg. Co., Dearborn, Mich.  
Michigan Drill Head Co., Detroit 34, Mich.  
Oilgear Co., 1569 W. Pierce St., Milwaukee, Wis.  
Vickers Incorporated, Div. of Sperry Rand Corporation, 1402 Oakman Blvd., Detroit, Mich.

#### INDEXING and SPACING EQUIPMENT

Austin Industrial Corp., White Plains, N. Y.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Eisler Engrg. Co., Inc., 750 South 13th St., Newark, N. J.  
Ettco Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y.  
Harding Bros., Inc., 1420 College Ave., Elmira, N. Y.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Kearney & Trecker Corp., 6784 W. National, Milwaukee 14, Wis.  
Morris, Robert E. Co., W. Hartford, Conn.  
Opto-Metric Tools, Inc., 137 Varick St., New York, N. Y.  
Robbins, Omer E. Co., 24800 Plymouth Rd., Detroit 39, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
Van Norman Mch., 3640 Main St., Springfield 7, Mass.  
Wadell Equip. Co., Clark, N. J.  
Western Machine Tool Works, Holland, Mich.

#### INDICATOR BASES, Magnetic

Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
DoAll Co., Des Plaines, Ill.  
Starrett, L. S., Co., Athol, Mass.

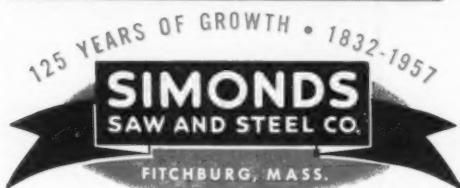
#### INDICATOR LIGHTS—See Lights, Indicator

#### INDICATORS, Dial

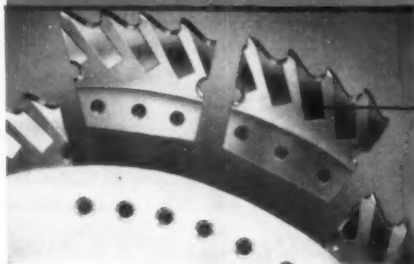
Ames, B. C., Waltham 54, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Federal Products Corp., P. O. Box 1027, Providence, R. I.  
Lufkin Rule Co., Saginaw, Mich.  
National Automatic Tool Co., S. 7th-N Sts., Richmond, Ind.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Starrett, The L. S. Co., Athol, Mass.

# SIMONDS SERVICE

*the Extra Value  
behind Every  
SIMONDS  
Segmental Saw!*



**SIMONDS SERVICE INCLUDES  
SHARPENING, RE-SEGMENTING AND REPAIRING  
BOTH TYPES**



Sure you get straighter cutting, smoother finish and greater satisfaction when you select Simonds Segmental Saws — with your choice of tongued or slotted segments. But you get a lot more!

You get fast, dependable service at Simonds Factory Branches from skilled Simonds servicemen who really know their business.

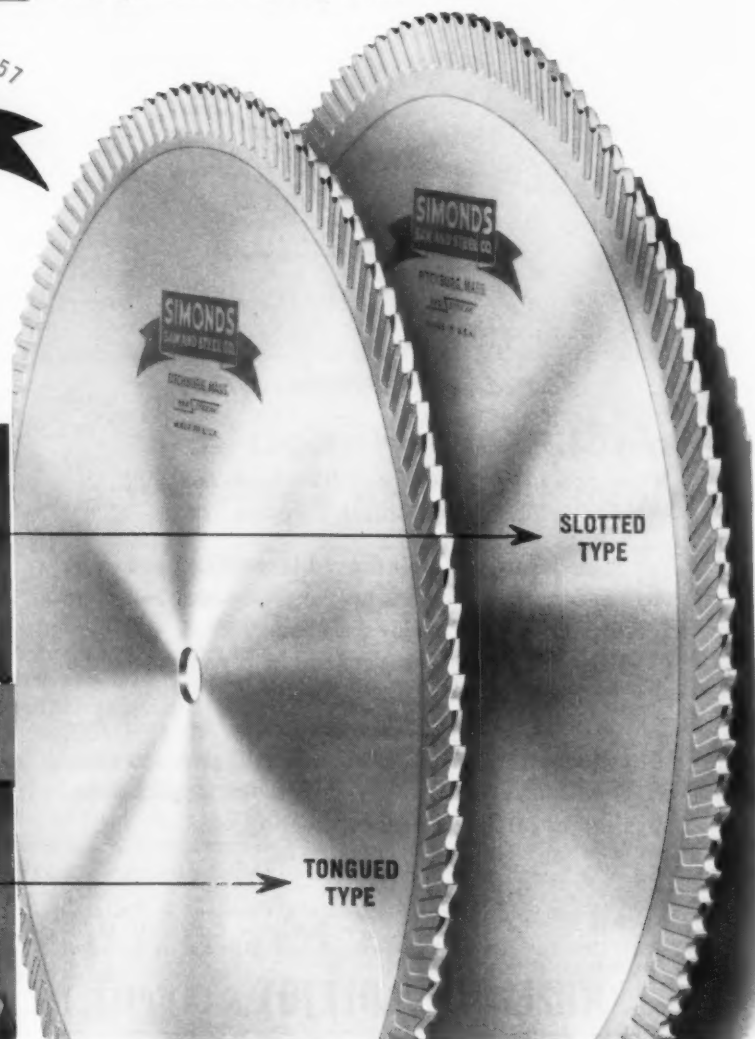
**In Sharpening** — Newest automatic sharpening machines operated by men who have an instinctive "feel" for the proper cutting edge combine to put "new life" in your favorite saws.

**In Repairing** — Specially designed equipment handles flattening, straightening, tensioning, riveting, and finish grinding.

**In Re-segmenting** — Specialists using the latest techniques and machines have the know-how to do any re-segmenting job quickly to your complete satisfaction.

For complete Segmental Saw Service send your saws to any of these Simonds Factory Branches: 1350 Columbia Road, Boston, Mass. • 3323 West Addison St., Chicago, Ill. • 228 First St., San Francisco, Calif. • 6500 N.E. Halsey St., Portland, Oregon.

**NOTE:** Simonds Segmental Saws (either tongued or slotted type) are made of tough shock-resistant alloy steel saw plate with accurately fitted High Speed Steel toothed segments securely riveted to the rim. Saws are also available with carbide tipped segments for cutting aluminum and magnesium.



Factory Branches in Boston, Chicago, Shreveport, La., San Francisco and Portland, Oregon, Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Heller Tool Co., Newcomerstown, Ohio, Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—331



*"Nous Sommes Ici!"*

**When you need it NOW call Wheelock-Lovejoy!**  
—for Alloy Steel bars, billets, forgings

Some jobs won't wait for red tape. When you want steel in a hurry—just pick up the phone and call your nearest Wheelock, Lovejoy warehouse.

Expert W-L metallurgists will help you choose the right stock for the job.

Write our Cambridge office today for your free Wheelock, Lovejoy Data Sheets. They'll give you complete technical information on grades, applications, physical properties, tests, heat treating, etc.

Warehouse Service—Cambridge • Cleveland • Chicago  
Hillside, N. J. • Detroit • Buffalo • Cincinnati • In  
Canada—Sanderson-Newbould, Ltd., Montreal & Toronto.

**WHEELOCK, LOVEJOY & COMPANY, INC.**

**138 Sidney Street, Cambridge 39, Mass.**

#### INDICATORS, Speed

Brown & Sharpe Mfg. Co., Providence, R. I.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Reliance Elec. & Engrg. Co., 1200 Ivanhoe Rd., Cleveland 10, Ohio  
Starrett, The L. S., Co., Athol, Mass.

#### INDICATORS, Test

Brown & Sharpe Mfg. Co., Providence, R. I.  
Federal Products Corp., P. O. Box 1027, Providence, R. I.  
National Automatic Tool Co., S. 7th & N Sts., Richmond, Ind.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Starrett, The L. S., Co., Athol, Mass.

#### INDUCTION HEATING EQUIPMENT

Cincinnati Milling & Grinding Mchcs., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
Lepel High Frequency Laboratories, Inc., Woodside 77, N. Y.  
Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland, Ohio  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.

#### INSPECTION EQUIPMENT, Ultrasonic

Curtiss-Wright Corp., Caldwell, N. J.

#### INTENSIFIERS, Hydraulic

Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
Logansport Mch. Co., Inc., Logansport, Ind.  
Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
Watson-Stillman Co., Roselle, N. J.

#### JACKS, Planer—See Set-up Equipment

#### JIG BORERS

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
American Sip Corp., 100 E. 42nd St., New York 17, N. Y.  
Cleereman Machine Tool Co., Green Bay, Wis.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio  
Homestrand, Inc., Larchmont, N. Y.  
M. B. I. Export & Import, Ltd., 475 Grand Course, New York 51, N. Y.  
Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### JIGS AND FIXTURES

Bath, Cyril Co., Aurora & Solon Road, Solon, Ohio  
Columbus Die Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio  
Hartford Special Mchry. Co., 287 Homestead Ave., Hartford, Conn.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
La Salle Tool, Inc., 3840 E. Outer Drive, Detroit 34, Mich.  
Metal Carbides Corp., Youngstown 12, Ohio  
Modern Industrial Engrg. Co., 14230 Birwood Ave., Detroit 28, Mich.  
Portage Mch. Co., 1025 Sweitzer Ave., Akron 11, Ohio  
Robbins, Omer E. Co., 24800 Plymouth Rd., Detroit 39, Mich.  
Sheffield Corp., 721 Springfield St., Dayton 1, Ohio

#### KEYSEATERS

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio  
Bliss, E. W. Co., Canton, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Davis Keyseater Co., 405 Exchange St., Rochester 8, N. Y.  
Heller Tool Co., Heller Dr., Newcomertown, Ohio  
Mitts & Merrill, 1809 S. Water St., Saginaw, Mich.

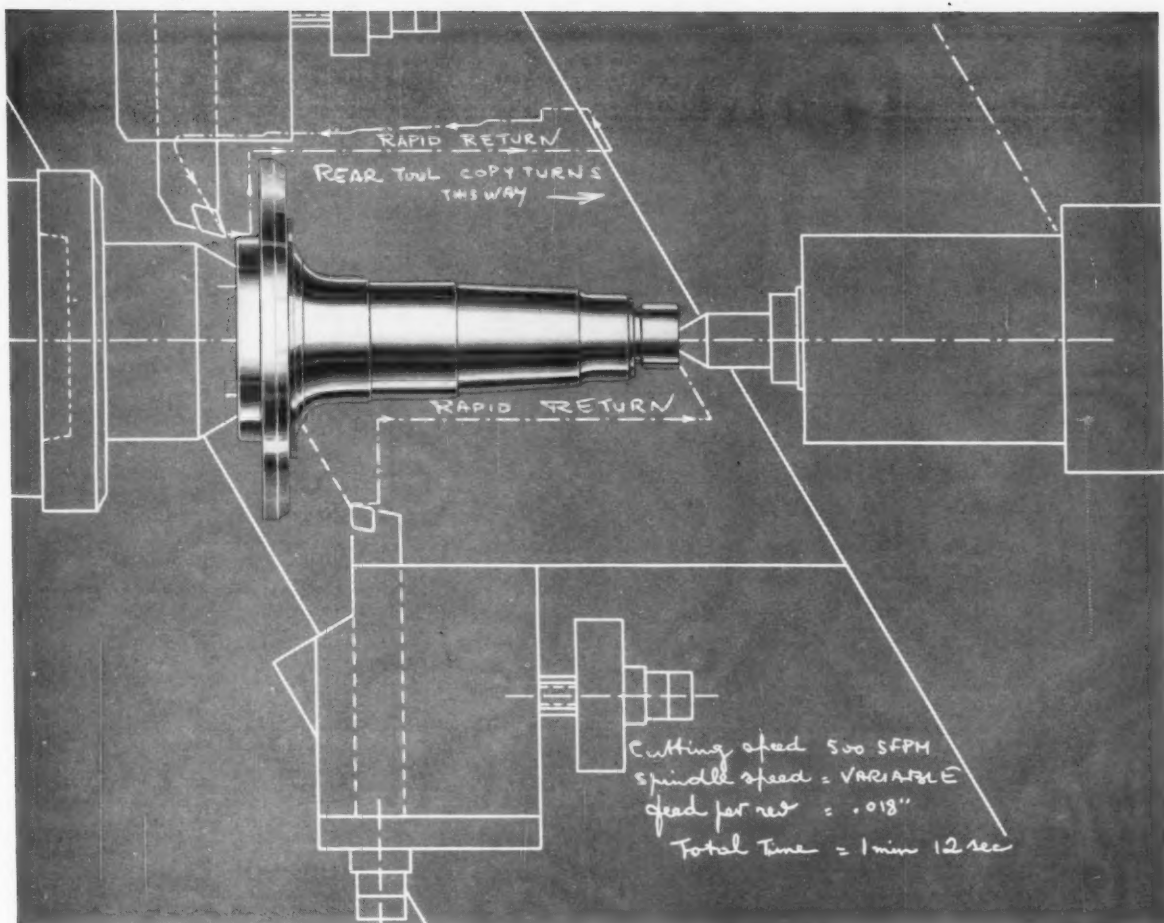
#### KNURLING TOOLS

Armstrong Bros. Tool Co., 5213 W. Armstrong Ave., Chicago 30, Ill.  
Pratt & Whitney Co., Inc., West Hartford, Conn.  
Reed Rolled Thread Die Co., P. O. Box 350 Worcester 1, Mass.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### LAPPING MACHINES

Cincinnati Milling & Grinding Mchcs., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
(Continued on page 334)





*Without special tooling* the Conomatic Pilot can copyturn a 90° reverse shoulder like this

With the Conomatic Pilot copying lathe, you can copyturn a 90° reverse shoulder with a single cross slide. Although this hydraulically-controlled multicycling lathe can be equipped with as many as two infeed slides and two cross slides, its ability to copyturn in reverse often makes costly special tooling unnecessary.

For example, the 90° reverse shoulder on the automatic transmission part shown above is copyturned in reverse by the rear tool on the 60° cross slide when the lathe's motorized template indexes after the front tool has completed its pass. Total time is 1 minute 12 seconds, with a gross production of 50 pieces per hour.

Write us today for a brochure giving details and specifications of the Conomatic Pilot—the world's most versatile copying lathe.

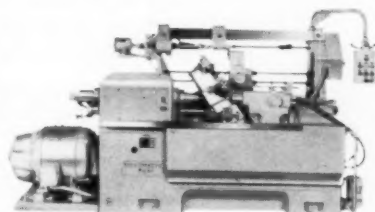
## Conomatic

CONE AUTOMATIC MACHINE CO., INC., WINDSOR, VT.

PILOT DIVISION

30 Rockefeller Plaza, New York 20, N. Y.

For more information fill in page number on Inquiry Card, on page 221



**The Conomatic Pilot Model KU:** A hydraulically-controlled multicycling copying lathe with piloted hydraulic feed that provides constant feed per revolution. Motorized rotating template provides up to four passes and four rapid returns or four additional passes in reverse. Adapted to completely automated loading and unloading.

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill. (Lapmaster Div.)  
DoAll Co., Des Plaines, Ill.  
Ex-Cell-G Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Gleason Works, 1000 University Ave., Rochester, N. Y.  
Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.  
Norton Co., 1 New Bond St., Worcester 6, Mass.

#### LATHE ATTACHMENTS

Atlas Press Co., Kalamazoo, Mich.  
Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Hardinge Bros., Inc., 1420 College Ave., Elmira, N. Y.  
Jones & Lamson Mch., 512 Clinton St., Springfield, Vt.

LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio  
Nebel Machine Tool Corp., 3401 Central Pkwy., Cincinnati 25, Ohio  
Sheldon Mch. Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### LATHES, AUTOMATIC—See Chucking Machines

#### LATHES, Axle

Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Consolidated Mch. Tool Div., Farrel-Birmingham Co., Inc., Rochester 10, N. Y.  
Monarch Mch. Tool Co., Oak St., Sidney, Ohio

Morey Machinery Co., 383 Lafayette St., New York 3, N. Y.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

#### LATHES, Bench

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Atlas Press Co., Kalamazoo, Mich.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Hardinge Bros., Inc., 1420 College Ave., Elmira, N. Y.  
Homstrand, Inc., Larchmont, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Levin, Louis & Son, Los Angeles 21, Calif.  
Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.

#### LATHES, Car Wheel

Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Bullard Co., Bridgeport 6, Conn.  
Consolidated Mch. Tool Div., Blossom Road, Rochester 10, N. Y.

#### LATHES, Copying, Duplicating

Pilot Div., Cone Automatic Mch. Co., 30 Rockefeller Plaza, New York, N. Y.  
Seewald Inc., 1956 Woodbridge Ave., New Brunswick, N. J.

#### LATHES, Crankshaft

Consolidated Mch. Tool Corp., Rochester, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

#### LATHES, Double-End

Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

#### LATHES, Duplicating

Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio  
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio  
Sidney Machine Tool Co., Sidney, Ohio

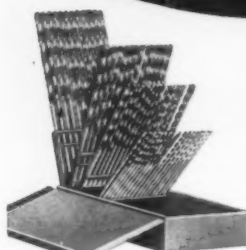
#### LATHES, Engine, Manufacturing

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio  
Atlas Press Co., Kalamazoo, Mich.  
Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Barber-Colman Co. (Hendey Mch. Div.), Rockford, Ill.  
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio  
Consolidated Mch. Tool Div., Blossom Road, Rochester 10, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
Eustacchio, S., Brescia, Italy  
Homstrand, Inc., Larchmont, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio

(Continued on page 336)

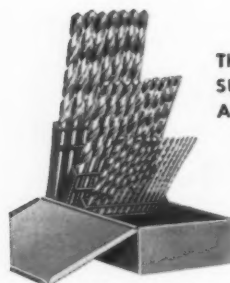
New way to buy the  
finest drills made!

## NEW ACE TAPER LENGTH DRILL SETS



WIRE SIZE SETS

FRACTIONAL  
SIZE SETS



LETTER SIZE SETS

THREE EXCLUSIVE NEW STANDARD STOCK DRILL SETS  
SUPPLIED IN CONVENIENT NEW FOLDING INDEX CASES  
AVAILABLE NOW AT NEW LOW MONEY SAVING PRICES!

- They're made of top quality high speed steel heat treated in continuous mill length bars to assure the ultimate in uniform hardness, extra toughness.
- They're ground-from-the-solid after hardening by special Ace-originated processes which produce more highly polished flutes plus keener, stronger cutting edges . . . finer, longer lasting drills.

Call your local distributor or  
write direct today for details  
on this NEW WAY TO BUY  
THE FINEST DRILLS MADE!



## ACE DRILL

ADRIAN, MICHIGAN

Originators of Ground-from-the-Solid High Speed Steel Drills

Taper Length Drills  
12" - 18" Longboy Drills  
Hardened H.S.S. Blanks  
General Purpose Drills

Stub Length Drills  
Heavy Duty Drills  
Slow Spiral Drills  
Fast Spiral Drills

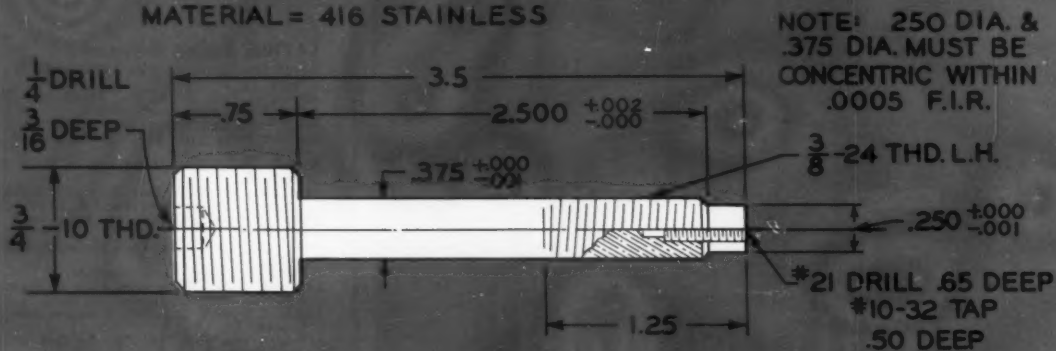
"Hi-Brinell" Drills  
Solid Carbide Drills  
Taper Shank Drills  
Chuckling Reamers

Carbide Tipped Drills  
Step & Subland Drills  
"L" & "M" Plastic Drills  
Drill Length Reamers

# When Seconds Count...

HOW WOULD YOU MAKE THIS PART . . . FASTER . . . AT LESS COST?

MATERIAL = 416 STAINLESS



There are two ways to manufacture this valve stud but only one method eliminates secondary operations, saving you time and money . . .

## OUTMODDED WAY

1. FEED STOCK (TURRET)
2. TURN .375 DIA.
3. TURN .250 DIA. AND SPOT DRILL
4. TAP DRILL
5. TAP
6. FEED STOCK (TURRET)
7. FORM
8. CUT-OFF

## SECONDARY OPERATIONS

9. THREAD 3/8-24 LH
10. THREAD 3/4-10 RH
11. DRILL 1/4 DIA. HOLE

## SCREWMATIC WAY

1. FEED STOCK (SWING STOP)
2. TURN .375 DIA.
3. TURN .250 DIA. AND SPOT DRILL
4. THREAD 3/8-24 LH
5. THREAD 3/4-10 RH
6. TAP DRILL
7. TAP #10-32 RH
8. CUT-OFF

NOTE: Forming operation will overlap turning operation—Facing .75 dimension with vertical slide tool overlap with cut-off. Use air clamping pick-up arm to pick-up part and drill 1/4 hole on back burring attachment.

## NO SECONDARY OPERATIONS



The Detroit Screwmatic 750 is simply constructed yet uses a powerful electronic power flow system. High spindle speeds (up to 7250 rpm) permit fast stock removal; variable speeds prolong tool life and permit use of modern cutting tools.

For complete information write for 16-page catalog—see how the Detroit Screwmatic can cut costs for you.



## THE GEAR GRINDING MACHINE COMPANY

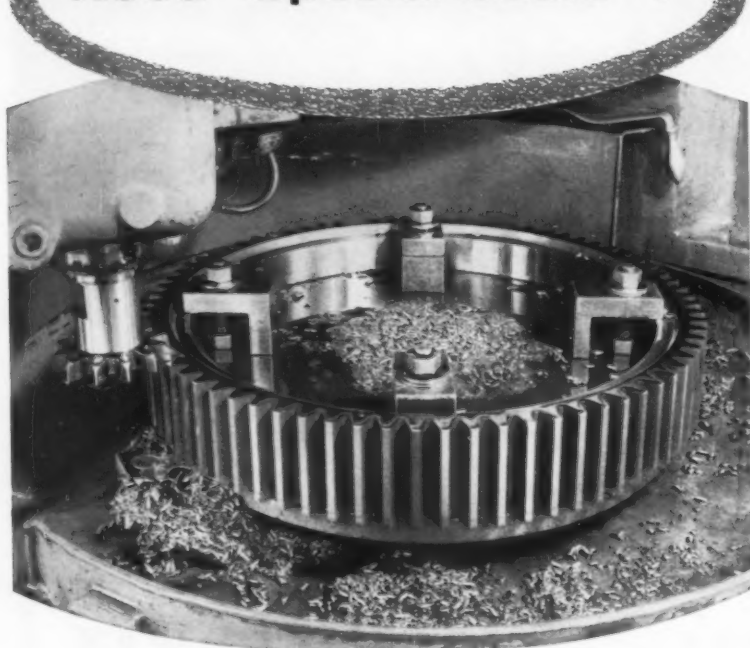
3921 Christopher • Detroit 11, Michigan

MANUFACTURERS OF: FULLY AUTOMATIC GEAR GRINDING MACHINES • RZEPPA (SHEPPA) CONSTANT VELOCITY UNIVERSAL JOINTS

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—335

## Need "Special Gears"?



## -check with FAIRFIELD!

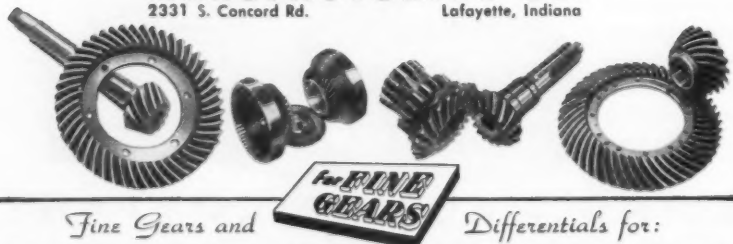
*How long will it take and how much will it cost?—These are points to check whenever you face the problem of setting up production facilities for gears. Special or unusual requirements in design, size, finish, tolerances, materials, and heat treatment are often "standard" at FAIRFIELD.*

As one of America's largest independent producers of gears and differentials, Fairfield has every facility needed for quantity production of gears to meet virtually any need. One of the big advantages, *when YOUR GEARS are made at Fairfield*, is that you get the benefits of high production rates and big volume output on all types and sizes of gears. *Your inquiry will receive prompt attention.*

### FAIRFIELD MANUFACTURING CO.

2331 S. Concord Rd.

Lafayette, Indiana



Fine Gears and

Differentials for:

TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES  
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio  
Nebel Machine Tool Corp., 3401 Central Pkwy., Cincinnati 25, Ohio  
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
Seewald Inc., 1956 Woodbridge Ave., New Brunswick, N. J.  
Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
Sidney Machine Tool Co., Sidney, Ohio  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Springfield Mch. Tool Co., Springfield, Ohio  
Western Machine Tool Works, Holland, Mich.  
Wicks Brothers, 512 No. Water St., Saginaw, Mich.

#### LATHES, Engine, Toolroom

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio  
Atlas Press Co., Kalamazoo, Mich.  
Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Barber-Colman Co. (Hendey Mch. Div.), Rockford, Ill.  
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Hardinge Bros. Inc., 1420 College Ave., Elmira, N. Y.  
Homstrand, Inc., Larchmont, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio  
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio  
Nebel Machine Tool Corp., 3401 Central Pkwy., Cincinnati 25, Ohio  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
Sidney Machine Tool Co., Sidney, Ohio  
South Bend Lathe Works Inc., 425 E. Madison St., South Bend, Ind.  
Springfield Mch. Tool Co., Springfield, Ohio  
Western Machine Tool Works, Holland, Mich.

#### LATHES, Gap

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Atlas Press Co., Kalamazoo, Mich.  
Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Homstrand, Inc., Larchmont, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio  
Nebel Machine Tool Corp., 3401 Central Pkwy., Cincinnati 25, Ohio  
Sidney Machine Tool Co., Sidney, Ohio  
Springfield Mch. Tool Co., Springfield, Ohio

#### LATHES, Hollow Spindle

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.  
Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Bliss, E. W., Co., Canton, Ohio  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio  
South Bend Lathe Works Inc., 425 E. Madison St., South Bend, Ind.

#### LATHES, Roll

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati 2, Ohio  
Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Bliss, E. W., Co., Canton, Ohio  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
Monarch Mch. Tool Co., Oak St., Sidney, Ohio

#### LATHES, Speed, Second-operation

Atlas Press Co., Kalamazoo, Mich.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Hardinge Bros., Inc., 1420 College Ave., Elmira, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio  
(Continued on page 338)

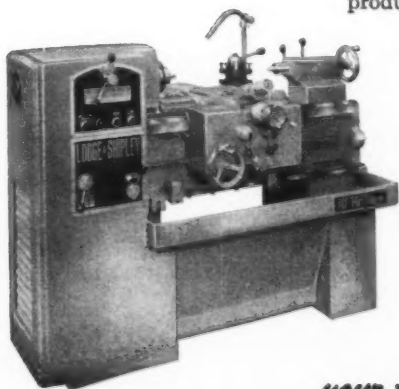


Quick  
as a...

on a lathe  
specifically designed  
for production  
with accuracy and economy



High speed turning, boring and facing are child's play . . . with the Lodge & Shipley HI-TURN Lathe. Whether on single or multiple-piece work, this 10" Production Lathe provides productive capacity at a price substantially below conventional lathes.



Designed for fast, convenient operation, it eliminates rarely used features, incorporates many standard features never before found at any cost in a lathe of this size.

The 10" HI-TURN gives you horsepower, rigidity and production you would normally expect to find in lathes costing twice as much. We can prove more production per lathe dollar . . . more production per operator hour!

*Find out how the HI-TURN Lathe fits your turning requirements.*

WRITE: LODGE & SHIPLEY, 3057 COLERAIN AVE., CINCINNATI 25, OHIO

*your LODGE-ical choice!*

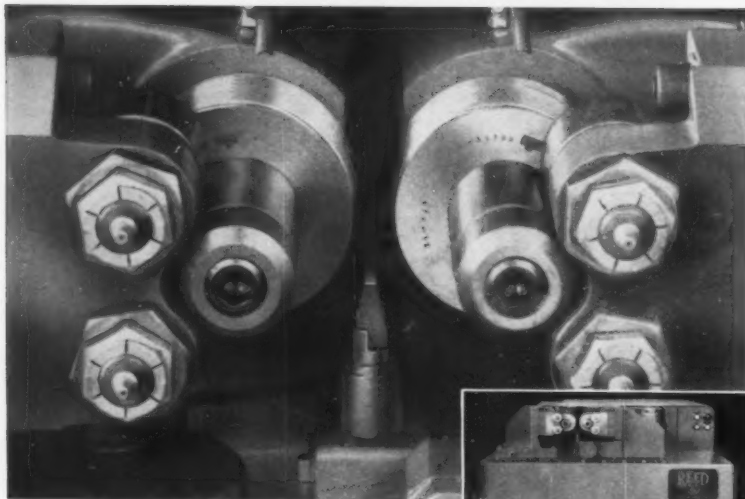
**Lodge & Shipley**

# REED

## Two Cylindrical Die Type

### THREAD ROLLING MACHINE

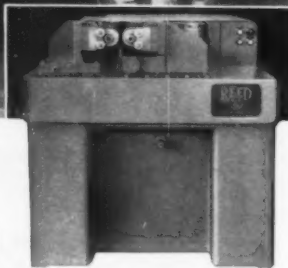
#### HORIZONTAL TYPE



**Especially Suited  
for Job Shops**

**for Both In-feed and Thru-feed Rolling  
on Large and Small Production Runs**

The use of highly skilled setup and operating personnel is not required, because of the simplicity of operation and of change-over from one job to another. Dies are quickly and easily matched with precise rotary "matching" device. A cam-actuated head feeds the dies into the work and provides complete and positive control of all phases of rolling operation. Fine micrometer adjustment provides for accurate final sizing. Can be used for manual, semi-automatic or completely automatic feeding at high production rates.



**DIAMETER  
CAPACITIES**

**In-feed - up to 2 inches**

**Thru-feed - up to  $\frac{3}{4}$  inch**



Write for  
*Machine Bulletin B110-1*

**Supplements Widely Used**  
**Reed Cylindrical Die Thread Rolling Machines**  
**of the Three Die Type**

**REED ROLLED THREAD DIE CO.**

*Specialists in Thread and Form Rolling Tools and Equipment*  
**WORCESTER 1, MASSACHUSETTS, U.S.A.**

**Sales Offices in:** Buffalo, Chicago, Cleveland, Compton, Calif., Denver, Detroit, Englewood, N. J., Houston, Indianapolis, Milwaukee, Montreal, New York City, Phila., Pittsburgh, St. Louis, Syracuse, Toronto

TRM-164

Lodge & Shipley Co., Cincinnati 25, Ohio  
Monarch Mch. Tool Co., Oak St., Sidney, Ohio  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sheldon Mch. Co., 4258 N. Knox Ave., Chicago 41, Ill.  
Standard Electrical Tool Co., 2500 River Rd., Cincinnati 4, Ohio

#### **LATHES, Spinning**

Cincinnati Milling & Grinding Mchcs., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
Lodge & Shipley Co., The, Cincinnati 25, Ohio

**LATHES, Toolroom**—See Lathes, Engine, Toolroom

#### **LATHES, Turret, Automatic**

Atlas Press Co., Kalamazoo, Mich.  
Bullard Co., Bridgeport 2, Conn.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Jones & Lamson Mch. Co., 512 Clinton St., Springfield, Vt.  
King Machine Tool Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
National Acme Co., 170 E. 131st St., Cleveland 3, Ohio  
New Britain Mch. Co., New Britain-Gridley Div., New Britain, Conn.

#### **LATHES, Turret, Ram Type, Saddle Type**

Atlas Press Co., Kalamazoo, Mich.  
Bardons & Oliver Inc., Ft. W. 9th St., Cleveland 13, Ohio  
Bullard Co., Bridgeport 2, Conn.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Hardinge Brothers, Inc., 1420 College Ave., Elmira, N. Y.  
Jones & Lamson Mch. Co., 512 Clinton St., Springfield, Vt.  
Levin & Son, Inc., Louis, Los Angeles 8, Calif.  
Morey Machinery Co., 383 Lafayette St., New York 3, N. Y.  
New Britain Mch. Co., New Britain-Gridley Div., New Britain, Conn.  
Seewald Inc., 1956 Woodbridge Ave., New Brunswick, N. J.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sheldon Mch. Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill.  
South Bend Lathe Wks., South Bend 22, Ind.  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio

**LATHES, Turret Vertical**—See Boring Mills, Vertical

#### **LAYOUT and DRAFTING TOOLS**

Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
Lufkin Rule Co., Saginaw, Mich.  
Starrett, L. S., Co., Athol, Mass.

#### **LEVELS**

Lufkin Rule Co., Saginaw, Mich.  
South Bend Lathe Wks., South Bend 22, Ind.  
Starrett, The L. S., Co., Athol, Mass.

**LIMIT SWITCHES**—See Switches, Limit

#### **LUBRICATING OILS and GREASES**

Cities Service Oil Co., 70 Pine St., New York, N. Y.  
Shell Oil Co., 50 W. 50th St., New York, N. Y.  
(Continued on page 340)



You **KNOW** where  
the holes will be...with

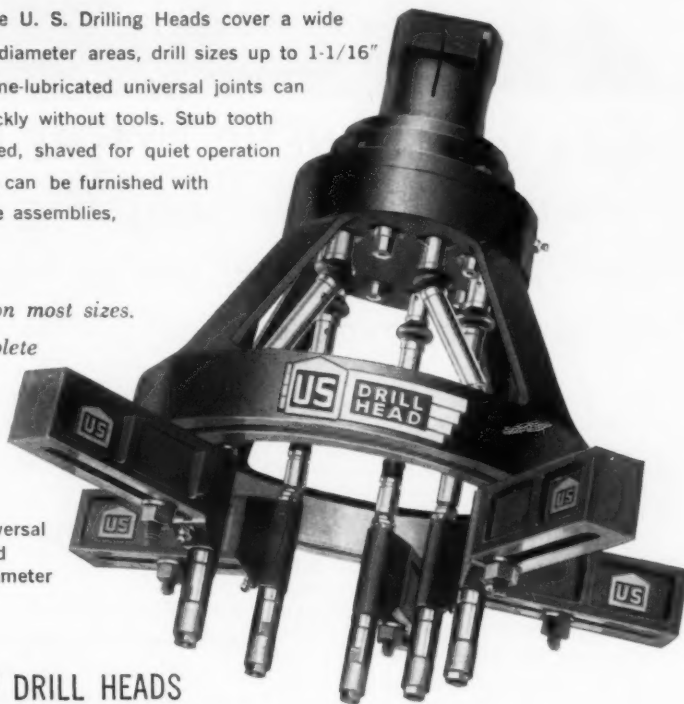
## UNIVERSAL ADJUSTABLE U.S. Drill Heads

"Shot gun accuracy" is for the birds. With U. S. Heads you pin-point your multiple-hole drilling *exactly*—position the drilling spindles for different patterns almost as easily and quickly as you read them from your prints. U. S. Drill Heads are fast, sturdy, long-lived and require only minimum maintenance—cut down expensive re-operating cost, too!

Universal Adjustable U. S. Drilling Heads cover a wide range—6" to 15" diameter areas, drill sizes up to 1-1/16". Totally-sealed, lifetime-lubricated universal joints can be interchanged quickly without tools. Stub tooth gears are heat treated, shaved for quiet operation and long life. All sizes can be furnished with adjustable arm spindle assemblies, or slip spindle plate.

*Immediate delivery on most sizes.  
Write today for complete  
specification data in  
new catalog  
No. AD-57.*

Style U-1L Universal  
Adjustable Head  
provides 9" diameter  
drilling area.



FOR MEN WHO KNOW DRILL HEADS  
BEST, IT'S ALWAYS U.S. DRILL HEAD...5 to 1.



We manufacture all types of adjustable, fixed center and individual lead screw tapping heads. Ask us to help solve your multiple drilling and tapping problems.

**UNITED STATES DRILL HEAD CO.**

BURNS STREET • CINCINNATI 4, OHIO

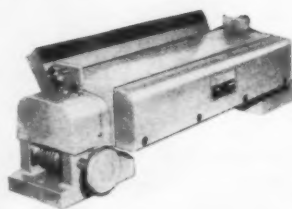
"We recommend  
it to our  
many  
customers"



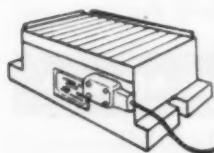
"Magna-Lock MAGNETIC FIXTURE has proved most efficient for sharpening our Shear-Speed Gear Cutter blades in the field" says Michigan Tool Company, Detroit

Each individual blade must be sharpened accurately. Each must be exactly like all the others in the set. The Magna-Lock Magnetic Fixture securely holds the set in correct alignment. The angular bar provides correct end position for the heel of each blade. Side-by-side alignment is made with the knurled screw. Rotational adjustment with vernier setting permits repetitive sharpening at the same correct angle and maintenance of the original form of the relieved tooth throughout the life of the blades.

Your holding problems, too, can very likely be solved by a standard or a special Magna-Lock electromagnetic chuck or holding device. It will pay you to secure full details now. Write Dept. M-117



Magna-Lock precision compound angular magnetic fixture, 6" x 24". Special backstop locator. Rotational adjustment with vernier setting. Knurled screw for side-by-side alignment of work pieces.



**Hanchett MAGNA-LOCK CORPORATION**  
BIG RAPIDS, MICHIGAN, U. S. A.

Designers and makers of a complete line of magnetic chucks and devices.

Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, Ill.  
Stuart, D. A. Oil Co. Ltd., 2727 S. Troy St., Chicago 23, Ill.  
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.  
Texas Co., 135 E. 42nd St., New York, N. Y.

#### LUBRICATING SYSTEMS

Farval Corp., 3249 E. 80th St., Cleveland, Ohio  
Gills Bros. Mfg. Co., 1846 S. Kilbourn Ave., Chicago 23, Ill.  
Madison-Kipp Corp., Madison, Wis.  
Onsrud Machine Works, Inc., Niles, Ill.

#### MACHINERY, Used and Rebuilt

Eastern Mchry. Co., 1000 Tennessee Ave., Cincinnati, Ohio  
Miles Mchry. Co., 2025 E. Genessee Ave., Saginaw, Mich.  
Van Keuren Co., Watertown 72, Mass.  
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### MACHINISTS' SMALL TOOLS

Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
Lufkin Rule Co., Saginaw, Mich.  
Niagara Mch. & Tool Wks., 637-697 Northland Ave., Buffalo 11, N. Y.  
Starrett, The, L. S., Co., Athol, Mass.

#### MANDRELS—See Arbors and Mandrels

#### MARKING MACHINES and DEVICES

Colonial Broach & Machine Co., P. O. Box 37, Harper St., Detroit 13, Mich.  
Gorton Mch. Co., 1321 Racine St., Racine, Wis.

#### MATERIAL-HANDLING TRUCKS—See Trucks, Material Handling

#### MEASURING MACHINES

Sheffield Corp., 721 Springfield St., Dayton 1, Ohio  
Van Keuren Co., Watertown 72, Mass.

#### MEASURING WIRES, Thread, Spline, Gear

Sheffield Corp., Dayton 1, Ohio  
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.  
Van Keuren Co., Watertown 72, Mass.

#### MICROMETER HEADS

Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
DoAll Co., Des Plaines, Ill.  
Starrett, The, L. S., Co., Athol, Mass.

#### MICROMETERS, Outside, Inside, Depth

Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Starrett, The, L. S., Co., Athol, Mass.  
Van Keuren Co., Watertown 72, Mass.

#### MICROSCOPES, Toolmakers'

Bausch & Lomb Optical Co., Rochester, N. Y.  
DoAll Co., Des Plaines, Ill.  
Opto-Metric Tools, Inc., 137 Varick St., New York, N. Y.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.



**MILLING MACHINE ATTACHMENTS**

Bridgeport Mchcs., Inc., 500 Lindley St., Bridgeport 6, Conn.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Cincinnati Milling & Grinding Mchcs., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
 G & L and Hypro Div., Giddings & Lewis Mch. Tool Co., Fond du Lac, Wis.  
 Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis.  
 Greaves Mch. Tool Div., 2011 Eastern Ave., Cincinnati 2, Ohio  
 Hardinge Bros., Inc., 1420 College Ave., Elmira, N. Y.  
 Homestrand, Inc., Larchmont, N. Y.  
 Kearney & Trecker Corp., Milwaukee, Wis.  
 Sheldon Mch. Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill.  
 Van Norman Co., 3640 Main St., Springfield 7, Mass.

**MILLING MACHINES, Automatic**

Cincinnati Milling Machine Co., Cincinnati, Ohio  
 Consolidated Machine Tool Corp., Rochester, N. Y.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
 Kearney & Trecker Corp., Milwaukee, Wis.  
 Marac Machinery Corp., Yonkers, N. Y.  
 Milholland, W. K., Machinery Co., 6402 Westfield Blvd., Indianapolis 5, Ind.  
 Pratt & Whitney Co., Inc., West Hartford, Conn.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
 Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
 U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

**MILLING MACHINES, Bench, Hand**

Atlas Press Co., Kalamazoo, Mich.  
 Hardinge Bros., Inc., 1420 College Ave., Elmira, N. Y.  
 Morris, Robert E. Co., W. Hartford, Conn.

**MILLING MACHINES, Bed Type, Simplex, Duplex**

Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
 Cincinnati Milling & Grinding Mchcs., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
 Consolidated Mch. Tool Div., Blossom Road, Rochester 10, N. Y.  
 Espen-Lucas Mch. Wrks., Front St. and Girard Ave., Philadelphia, Pa.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Kearney & Trecker Corp., Milwaukee, Wis.  
 Morey Machinery Co., 383 Lafayette St., New York 3, N. Y.  
 Morris, Robert E. Co., W. Hartford, Conn.  
 Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
 Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
 U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.  
 Van Norman Co., 3640 Main St., Springfield 7, Mass.

**MILLING MACHINES, Circular, Continuous**

Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.  
 Espen-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Kearney & Trecker Corp., Milwaukee, Wis.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
 Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

**MILLING MACHINES, Die Sinking, Duplicating, Profiling**

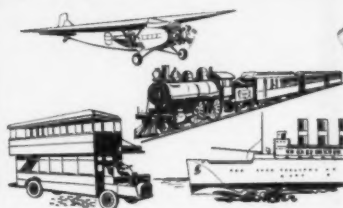
Arrow Engineering Co., Inc., 120 E. Market St., Indianapolis, Ind.  
 Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
 Bridgeport Mchcs., Inc., 500 Lindley St., Bridgeport 6, Conn.  
 Cincinnati Milling & Grinding Mchcs., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
 Colonial-Romulus Div., Parkgrove Station, Detroit 5, Mich.  
 Consolidated Mch. Tool Div., Blossom Road, Rochester 10, N. Y.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Elox Corp. of Mich., 1830 Stephenson Highway, Royal Oak 3, Mich.

(Continued on page 342)

# WILLIAMS

## TOOLS OF INDUSTRY

FOREMOST! Since...



- Famous old "999" scorched the rails at 112 mph in 1893
- The "Oceanic" ushered in the luxury ocean liner era in 1870
- The 5th Ave. Double-deck bus appeared in 1905
- The year of the Model T, 1908, led to America on wheels
- Cross-country air service in 1930 introduced mass air travel



Since 1882, Williams has anticipated the tool requirements for production and maintenance in the transportation industry. Among the hundreds of patterns and sizes of tools which Williams forges are Carbon Steel Wrenches... Alloy Steel Superrenches® and Super-sockets®... and a wide range of extra tough "C" Clamps.

TODAY... Williams makes the *Broadest Line of Its Kind* for this and other important industries. Write for Catalog 303.

YOU GET QUICKEST DELIVERY AT LOWEST COST  
FROM YOUR LOCAL DISTRIBUTOR.

**J. H. WILLIAMS & CO.**

408 Vulcan St., Buffalo 7, N. Y.

BUFFALO • NEW YORK • CHICAGO • LOS ANGELES

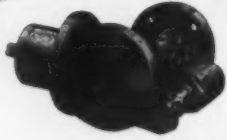
# VIKING PUMPS

any way you  
want them



stripped models

The internal working parts of original "gear within a gear" Viking pumps are available to fit into your integral casing. Conserves space, piping arrangement, drive equipment, etc. Available in 2/3, 1-1/2, 3-1/2, 5, 10, 18 GPM and larger. Positive, self-priming, capable of handling all types of liquids up to several hundred pounds discharge pressure, in many models.



custom models

No matter how you wish to apply the positive self-priming Viking pump, it can be custom built in the size and casing design to fit your piping and drive arrangement. Thousands of individual problems have been successfully answered with specially designed Viking "Gear-within-a-gear" pumps.



standard models

Pick any standard Viking pump in 21 sizes from 2/3 to 1030 GPM, in many types of mounting and drive arrangements. They are available from over 750 cataloged models.

Send your pumping problem today and ask for bulletin 575J.



**VIKING PUMP CO.**

Cedar Falls, Iowa, U.S.A.

In Canada, it's "ROTO-KING" pumps  
See Our Catalog in Sweets Product Design File

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
G & L and Hypro Div., Giddings & Lewis Mch. Tool Co., Fond du Lac, Wis.  
Gorton, George, Machine Co., 1110 W. 13th St., Racine, Wis.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Morey Machinery Co., 383 Lafayette St., New York 3, N. Y.  
Onsrud Machine Works, Inc., Niles, Ill.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
Sundstrand Mch. Tool Co., 2531 - 11th St., Rockford, Ill.

## MILLING MACHINES, Knee Type, Horizontal, Plain, Universal

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Austin Industrial Corp., 76 Mamaroneck Ave., White Plains, N. Y.  
Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Sullard Co., Bridgeport 6, Conn.  
Cincinnati Milling & Grinding Mches., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
DeVlieg Machine Co., Ferndale, Mich.  
Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
Greaves Machine Tool Div., 2009 Eastern Ave., Cincinnati, Ohio  
Hardinge Bros., Inc., 1420 College Ave., Elmira, N. Y.  
Homestrand, Inc., Larchmont, N. Y.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Morris, Robert E. Co., W. Hartford, Conn.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Sheldon Machine Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
Van Norman Co., 3640 Main St., Springfield 7, Mass.

## MILLING MACHINES, Knee Type Rise and Fall

Cincinnati Milling & Grinding Mches., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Homestrand, Inc., Larchmont, N. Y.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Nichols-Morris Corp., 76 Mamaroneck Ave., White Plains, N. Y.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.

## MILLING MACHINES, Knee Type Ram

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
Gorton Mch. Co., 1321 Racine St., Racine, Wis.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Van Norman Co., 3640 Main St., Springfield 7, Mass.

## MILLING MACHINES, Knee Type Vertical

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Gorton Mch. Co., 1321 Racine St., Racine, Wis.

## MILLING MACHINES, Knee Type, Vertical

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Atlas Press Co., Kalamazoo, Mich.  
Austin Industrial Corp., 76 Mamaroneck Ave., White Plains, N. Y.  
Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Bridgeport Mches., Inc., 500 Lindley St., Bridgeport 6, Conn.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling & Grinding Mches., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
Homestrand, Inc., Larchmont, N. Y.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
South Bend Lathe Wks., South Bend 22, Ind.

## MILLING MACHINES, Planer Type

Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Consolidated Mch. Tool Div., Blossom Road, Rochester 10, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Espen-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.  
G & L and Hypro Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Gray, S. A., Co., Woodburn Ave. and Penn R. R., Evanston, Cincinnati, Ohio  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Morey Machinery Co., 383 Lafayette St., New York 3, N. Y.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Sundstrand Mch. Tool Co., 2531 - 11th St., Rockford, Ill.

## MILLING MACHINES, Spar

Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Cincinnati Milling & Grinding Mches., Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
G & L and Hypro Div., Giddings & Lewis Mch. Tool Co., Fond du Lac, Wis.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Morey Machinery Co., 383 Lafayette St., New York 3, N. Y.  
Sundstrand Mch. Tool Co., 2531 - 11th St., Rockford, Ill.

## MILLING MACHINES, Thread

Coulter, James, Machine Co., 629 Railroad Ave., Bridgeport 5, Conn.  
Hanson-Whitney Co., 169 Bartholomew Ave., Hartford 3, Conn.

## MOLDING MACHINES, Plastic

Baker Bros., Inc., 1000 Post St., Toledo 10, Ohio  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
Watson-Stilman Co., Roselle, N. J.

## MOTORS, Air

Ingersoll-Rand Co., Phillipsburg, N. J.

## MOTORS, Electric

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
Howell Electric Motors Co., Howell, Mich.  
Lincoln Electric Co., Cleveland 17, Ohio  
Reliance Electric & Engrg. Co., 1074 Ivanhoe Rd., Cleveland 10, Ohio

## MOTORS, Hydraulic

Barnes, J. S., Corp., Rockford, Ill.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Hydraulic Press Mfg. Div., Mt. Gilead, Ohio  
Oilgear Co., 1569 W. Pierce St., Milwaukee, Wis.  
Sundstrand Mch. Tool Co., 2531 - 11th St., Rockford, Ill.  
Vickers, Inc., Detroit 32, Mich.

## MULTIPLE INSPECTION GAGES—See Gages, Multiple Inspection

## MULTIPLE-STATION MACHINES, Dial Type

Avey Drilling Mch. Co., 25 E. 3rd St., Covington, Ky.  
Baker Bros., Inc., 1000 Post St., Toledo 10, Ohio  
Barnes Drill Co., 814 Chestnut St., Rockford, Ill.  
Baush Mch. Tool Co., 15 Wasen Ave., Springfield, Mass.  
Crass Co., 3250 Bellevue, Detroit 7, Mich.  
Etico Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y.  
Federal Prod. Corp., 1144 Eddy St., Providence 1, R. I.  
Greenlee Bros. & Co., 2136 - 12th St., Rockford, Ill.  
Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
Kingsbury Mch. Tool Corp., Keene, N. H.  
LaSalle Tool, Inc., 3840 E. Outer Drive, Detroit 34, Mich.  
Modern Industrial Engrg. Co., 14230 Birwood Ave., Detroit 38, Mich.

(Continued on page 344)

# Maybe you're paying for top quality "Commercial Grade" Roller Bearings... **BUT ARE YOU GETTING THEM?**

**T**True, there's a wide difference in quality and cost between the low-range and high-range of any "commercial grade" bearing. But every Rollway Tru-Rol "commercial grade" bearing approximates as closely as possible maximum standards of construction consistent with the price.

*Take the matter of separators, for example:* In Rollway bearings, separators give maximum guidance to each roller. The result is greater total load capacity and longer life.

Equal spacing of rollers means uniform distribution of load. The result is the elimination of destructive "pulse" and vibration.



Cutaway view of Rollway Tru-Rol® segmented-retainer roller bearing  
... one of three distinct types of Tru-Rol bearings available.

Moreover, separators are of deep section, formed to the curve of the rollers, giving true axial alignment, smooth-surface contact and an even lubrication film on each roller.

It's little things like these that mount up to big savings in service. Check the accompanying list,

or ask a nearby Rollway Service Engineer to explain in detail the quality you should be getting in your "commercial grade" bearings. No cost. No obligation. Just write us. Rollway Bearing Co., Inc., 586 Seymour St., Syracuse, N. Y., *manufacturers of a complete line of radial and thrust cylindrical roller bearings.*

ENGINEERING OFFICES: SYRACUSE • BOSTON • CHICAGO • DETROIT • TORONTO • PITTSBURGH • CLEVELAND • MILWAUKEE • SEATTLE • HOUSTON • PHILADELPHIA • LOS ANGELES • SAN FRANCISCO

## *Check This List* **AND BE SURE!**

### **Retainer Operation**

☐ Is the retainer roller-supported, to reduce sliding friction?

### **Retainer Construction**

☐ Is the retainer strong enough to withstand shock loads and sudden reversals?

*(A Rollway segmented-type steel retainer, such as that illustrated, is the strongest, most durable available in commercial grade bearings.)*

### **Roller Spacing**

☐ Are all rollers equally separated, or do some rub against each other in opposed-motion friction?

☐ Are rollers distributed evenly to prevent "pulse" and vibration?

### **Roller Construction**

☐ Are the rollers crowned for optimum load distribution?

**For Top Quality in Every Detail Buy Tru-Rol and Be Sure!**



National Automatic Tool Co., S. 7th N. Sts., Ave., Detroit 7, Mich.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette  
 Richmond, Ind.  
 Sundstrand Mch. Tool Co., 2531 - 11th St.,  
 Rockford, Ill.  
 Verson Allsteel Press Co., 9309 S. Kenwood  
 Ave., Chicago 19, Ill.

### MULTIPLE-STATION MACHINES, Transfer Type

Avey Drilling Mch. Co., 25 E. 3rd St., Covington, Ky.  
 Baker Bros., Inc., 1000 Post St., Toledo 10, Ohio  
 Barnes Drill Co., 814 Chestnut St., Rockford, Ill.  
 Baush Mch. Tool Co., 15 Wason Ave., Springfield, Mass.  
 Buhr Mch. Tool Co., 839 Green St., Ann Arbor, Mich.  
 Bullard Co., Bridgeport 6, Conn.  
 Cincinnati Milling Mch. Co., Cincinnati 9, Ohio  
 Clearing Mch. Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Davis & Thompson Co., 4460 N. 124th St., Milwaukee 10, Wis.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Greenlee Bros. & Co., 2136 - 12th St., Rockford, Ill.  
 Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
 Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
 Kearney & Trecker Corp., Milwaukee, Wis.  
 La Salle Tool, Inc., 3840 E. Outer Drive, Dearborn, Mich.  
 Modern Industrial Engrg. Co., 14230 Birwood Ave., Detroit 38, Mich.  
 Moline Tool Co., 102-20th St., Moline, Ill.  
 National Automatic Tool Co., S. 7th N. Sts., Richmond, Ind.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.

Snyder Tool & Engrg. Co., 3400 E. Lafayette Ave., Detroit 7, Mich.  
 Sundstrand Mch. Tool Co., 2531 - 11th St., Rockford, Ill.  
 Verson Allsteel Press Co., 9399 S. Kenwood Ave., Chicago 19, Ill.

### NIBBLING MACHINES

Fenway Machine Co., Inc., Willow Grove, Penna.  
 Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.  
 Wales-Strippit Corp., Akron, N. Y.

### NICKEL AND NICKEL ALLOYS

Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Square, Pittsburgh 22, Pa.

**NUT SETTERS**—See Screwdrivers, etc.

**NUTS**—See Bolts, Nuts and Screws

### OIL GROOVERS

Wicaco Machine Corp., Wayne Junction, Philadelphia, Pa.

### OILERS AND LUBRICATORS

Gifts Bros. Mfg. Co., 1858 S. Kilbourn Ave., Chicago, Ill.  
 Madison-Kipp Corp., Madison, Wis.  
 Wicaco Mch. Corp., Philadelphia, Pa.

**OILS, CUTTING SOLUBLE**—See Cutting and Grinding Fluids

**OILS, Lubricating**—See Lubricating Oils and Greases

### OILS, Quenching and Tempering

Cities Service Oil Co., 70 Pine St., New York, N. Y.  
 Shell Oil Co., 50 W. 50th St., New York, N. Y.  
 Sinclair Refining Co., 600 - 5th Ave., New York, N. Y.  
 Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.  
 Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa.

### OPTICAL FLATS

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.  
 DoAll Co., Des Plaines, Ill.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Van Keuren Co., Watertown 72, Mass.

### PACKING, Leather, Metal, Rubber Asbestos, Etc.

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.  
 Watson-Stillman Co., Roselle, N. J.

**PAINTING EQUIPMENT, Spray**—See Spraying Equipment, Metal

### PARALLELS

Brown & Sharpe Mfg. Co., Providence, R. I.  
 DoAll Co., Des Plaines, Ill.  
 G & L and Hypro Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Lufkin Rule Co., Saginaw, Mich.  
 Starratt, The L. S. Co., Athol, Mass.  
 Walker, O. S. Co., Inc., Worcester, Mass.

### PATTERNS, Wood and Metal

Mummert-Dixon Co., Hanover, Pa.

### PIPE, Steel, Stainless, etc.

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Babcock & Wilcox Co. (Tubular Prod. Div.), Beaver Falls, Penna.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Carpenter Steel Co., 105 W. Bern St., Reading, Pa.  
 Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Square, Pittsburgh 22, Pa.  
 Ryerson, Joseph T. & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.  
 United States Steel Corp., National Tube Co., Div., 436 7th Ave., Pittsburgh, Pa.

### PIPE AND TUBING MILLS, Electric-weld

Yoder Co., 5504 Walworth Ave., Cleveland 2, Ohio

### PIPE AND TUBING, Brass and Copper

American Brass Co., 25 Broadway, New York, N. Y.  
 Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.  
 Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.



ERRINGTON

**UNIVERSAL JOINT  
ADJUSTABLE  
TAPPING & DRILLING HEAD**

Here's another hi-speed production tool from Errington. This dependable tool is adjustable to any pattern of holes . . . is available with 4 or 6 spindles. Positive clutch drive and reverse. Head made of the best grade sand Cast Aluminum with hardened and ground gears and spindles (made in one piece). Full grooved ball thrust bearings at all thrust points and Oilite bronze radial bearings. Remember to do more . . . better . . . faster . . . rely on Errington Hi-Speed Production Tools.

#0—0" to 1/4" Tap Capacity  
Min. centers 11/16"  
Max. Pattern 5 1/4"

#1—7/32" to 1/2" Tap Capacity  
Min. centers 1 1/4"  
Max. Pattern 8"

LESS THAN  
1/2 MINUTE  
TO CHANGE  
HEAD FROM  
DRILLING TO  
TAPPING OR  
DRILLING

Write for Complete Information

**ERRINGTON Mechanical Laboratory, Inc.**

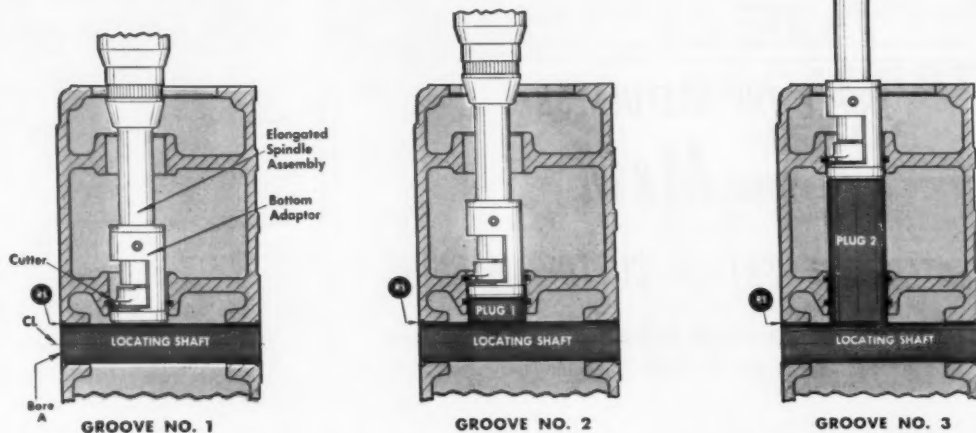
Established 1891

Main Office and Plant: STATEN ISLAND 4, NEW YORK



# Waldes Truarc Grooving Tool pays for itself with big savings on one small run!

3 internal recesses cut in bores of 100 castings  
in 17.5 hours...including set-up time



The job shown above called for three grooves located at prescribed distances from center-line CL of bore A. Depth and location tolerances:  $\pm .0015''$ .

Size and shape of the castings made nesting difficult for a boring bar operation. Exterior surfaces were unmachined, making alignment complicated. With two grooves over 7" from the housing's open end, boring bar chatter could have caused costly rejects.

To overcome these obstacles a Waldes Truarc Grooving Tool was equipped with an elongated spindle assembly and bottom adaptor. The tool was mounted in a drill press, the castings in a large vise. Grooves were then cut as follows:

**Groove No. 1:** A locating shaft was inserted into bore A as a reference surface and the tool piloted into the housing until the bottom adaptor banked on the shaft. The tool is designed so that the cutter rotates in

a neutral position until additional downward pressure is applied. It then moves into cutting position until pre-set groove depth is reached, after which the tool idles. Release of pressure returns the cutter to neutral so that the tool may be withdrawn.

**Groove No. 2:** Plug 1 was inserted into the bore over the locating shaft and the tool again piloted into the bore. The groove was then cut the same way as Groove No. 1.

**Groove No. 3:** Plug 2 was substituted for the first plug and the cutting operation repeated.

All 300 grooves were held to prescribed tolerances. Set-up time: exactly 11 minutes. Operating time: 1050 minutes for 100 castings. Rejects: none!

No recessing problem is too tough for the amazingly versatile Waldes Truarc Grooving Tool. It's so simple even unskilled labor can use it accurately.

Write for a 20-page manual containing full information on Waldes Truarc Grooving Tool.



**WALDES**  
**TRUARC**  
**GROOVING TOOL**  
U.S. Pat. 2,411,426.



WALDES KOHINOOR, INC., 47-16 Austel Place, L.I.C. 1, N.Y.

**Waldes Kohinoor, Inc.**  
47-16 Austel Pl., L. I. C. 1, N. Y.

Please send me your new 20-page technical manual on the Waldes Truarc Grooving Tool. (GT-2-53)

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

**PIPE THREADING AND CUTTING MACHINES**

Davis & Thompson Co., 4460 N. 124th St., Milwaukee 10, Wis.  
Landis Machine Co., Inc., Waynesboro, Pa.  
Sheffield Machine Co., Inc., Waynesboro, Pa.

**PLANER JACKS**—See Set-up Equipment

**PLANERS, Double Housing and Openside**

Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Consolidated Mch. Tool Div., Rochester, N. Y.  
G & L and Hypro Div., Gliddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Gray, G. A. Co., 3611 Woodburn Ave., Cincinnati, Ohio  
Orban, Kurt Co., Inc., 42 Exchange Place, Jersey City 2, N. J.  
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.

Seewald Inc., 1956 Woodbridge Ave., New Brunswick, N. J.

**PLASTICS AND PLASTIC PRODUCTS**

Dow Chemical Co., Midland, Mich.  
Eastman Kodak Co., 343 State St., Rochester 4, N. Y.  
Gisholt Mch Co., Madison, Wis.  
U. S. Steel Corp., Nat'l Tube Div., Pittsburgh, Pa.

**PRESS BRAKES**—See Brakes, Presses and Bending

**PRESS FEEDER, Automatic**

Bliss Co., E. W., Canton, Ohio  
Federal Press Co., 511 Division St., Elkhart, Ind.  
Nilson, A. H. Machine Co., Bridgeport, Conn.  
Producta Machine Co., 985 Housatonic Ave., Bridgeport 1, Conn.  
U. S. Tool Co., East Orange, N. J.

**PRESSES, Arbor**

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
Famco Machine Co., Kenosha, Wis.  
Hannifin Corp., 510 S. Wolf Rd., Des Plaines, Ill.  
Logansport Machine Co., Inc., Logansport, Ind.  
Threadwell Top & Die Corp., 16 Arch St., Greenfield, Mass.  
Watson-Stilman Co., Roselle, N. J.  
Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Assembling**

Alva Allen Industries, Clinton, Mo.  
Bliss, E. W. Co., 1375 Raff Rd. S. W., Canton, Ohio  
Colonial Broach & Machine Co., Box 37, Detroit 13, Mich.  
Detroit Broach Co., Inc., 950 S. Rochester Rd., Rochester, Mich.  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
Federal Press Co., 511 Division St., Elkhart, Ind.  
Ferracute Machine Co., Bridgeton, N. J.  
Hannifin Corp., 510 S. Wolf Rd., Des Plaines, Ill.  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.

**PRESSES, Blanking, Stamping**

Alva Allen Industries, Clinton, Mo.  
Alpha Press & Machine, Inc., 9281 Freeland Ave., Detroit 28, Mich.  
Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Bath, Cyril Co., 32324 Solon Rd., Solon, Ohio  
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
Bliss, E. W. Co., 1375 Raff Rd. S. W., Canton, Ohio  
Chambersburg Engineering Co., Chambersburg, Pa.  
Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
Cleveland Crane & Engineering Co., Wickliffe, Ohio  
Cleveland Punch & Shear Wks. Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
Danly Machine Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.  
Federal Machine & Welder Co., 1745 Overland Ave. N. E., Warren, Ohio  
Federal Press Co., 511 Division St., Elkhart, Ind.  
Ferracute Machine Co., Bridgeton, N. J.  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
L & J Press Corp., 1631 Sterling Ave., Elkhart, Ind.  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio  
Minster Machine Co., Minster, Ohio  
Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
U. S. Tool Co., Inc., 55 N. 18th St., East Orange, N. J.  
V & O Press Co., Hudson, New York  
Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Briquetting**

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
Wilson, K. R., Inc., Arcade, N. Y.

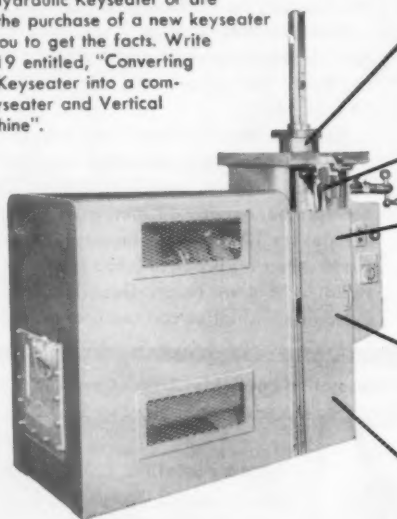
**PRESSES, Closed-Die Forging**

Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland 17, Ohio  
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
Bliss, E. W. Co., 1375 Raff Rd. S. W., Canton, Ohio  
Chambersburg Engineering Co., Chambersburg, Pa.  
Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
Wilson, K. R., Inc., Arcade, N. Y.

## TRIPLE THE USEFULNESS OF YOUR **M&M** KEYSEATER AND VERTICAL CUTTING MACHINE

Simple modification greatly increases productive capacity of this versatile machine.

An M & M Hydraulic Keyseater is not only a keyseater that cuts internal keyways up to 5" wide but a vertical cutting machine as well. Serrations, grooves, teeth—a wide variety of cuts can be rapidly made on this machine with only one simple modification—a work-holding table. This table is now available at moderate cost. If you now own an M & M Hydraulic Keyseater or are considering the purchase of a new keyseater it will pay you to get the facts. Write for Bulletin 19 entitled, "Converting the M & M Keyseater into a combination Keyseater and Vertical Cutting Machine".



Cuts internal keyways



Cuts internal forms or shapes



Cuts grooves and serrations



Cuts any shapes

## **M&M** KEYSEATERS AND VERTICAL CUTTING MACHINES

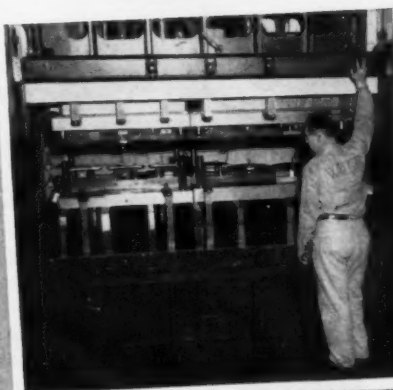
**MITTS & MERRILL** • 64 Holden Street • SAGINAW, MICHIGAN

98



TRADE **Verson** MARK

**OFFERS YOU  
VERSATILITY  
TO MEET THE  
BROADEST  
NEEDS**



A typical job at Westlof Tool & Die Co. — die tryout on progressive tooling. The press is also used for die tryout on Transmat type tooling.



Catalog G-57 presents basic data on all types of Verson presses. Write for your copy.

Die tryout for a tool and die shop is probably one of the severest tests of the versatility of a press. At Westlof Tool & Die Co., Detroit, Michigan, a 300 ton Verson double crank, straight side press is used for this purpose.

The press itself incorporates several features which are examples of the versatility Verson engineering can provide: The ram is equipped with three triple bank cushions adjustable right or left to 7" centers. The bed has two large cushions, one right, one left. All cushions are independently controlled. The press is equipped for application of coil feeding equipment should it become necessary. Press speed is variable from 15 to 30 strokes per minute. Power adjustment of the slide is 15".

If your requirements call for great versatility, bring your problem to Verson. For specific recommendations, just send an outline of your needs.

**A Verson Press for every job from 60 tons up.**



ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

**VERSON ALLSTEEL PRESS CO.**

9309 S. KENWOOD AVENUE, CHICAGO 19, ILLINOIS • 8300 S. CENTRAL EXPRESSWAY, DALLAS, TEXAS

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • Verson-WHEELON HYDRAULIC PRESSES

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—347

**PRESSES, Coining, Embossing**

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
 Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Chambersburg Engineering Co., Chambersburg, Pa.  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Cleveland Punch & Shear Wks. Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
 Danly Machine Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio  
 Ferracute Machine Co., Bridgeton, N. J.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Minster Machine Co., Minster, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.

Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Die Sinking (Hobbing)**

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
 Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Chambersburg Engineering Co., Chambersburg, Pa.  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Die Tryout**

Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Cleveland Punch & Shear Wks. Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio  
 Federal Press Co., 511 Division St., Elkhart, Ind.  
 Ferracute Machine Co., Bridgeton, N. J.  
 Hannifin Corp., 510 S. Wolf Rd., Des Plaines, Ill.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 L & J Press Corp., 1631 Sterling Ave., Elkhart, Ind.  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Minster Machine Co., Minster, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 Product Machine Co., 985 Housatonic Ave., Bridgeport 1, Conn.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Drawing**

Alva Allen Industries, Clinton, Mo.  
 Baird Machine Co., 1700 Stafford Ave., Stratford, Conn.  
 Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
 Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Cincinnati Milling & Grinding Machines, Inc., 4710 Marburg Ave., Cincinnati 9, Ohio  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Cleveland Crane & Engineering Co., Wickliffe, Ohio  
 Cleveland Punch & Shear Wks. Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
 Danly Machine Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio  
 Ferracute Machine Co., Bridgeton, N. J.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 L & J Press Corp., 1631 Sterling Ave., Elkhart, Ind.  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Minster Machine Co., Minster, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 Nilson, A. H. Machine Co., Bridgeport, Conn.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Extrusion**

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
 Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Danly Machine Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Watson-Stillman Co., Roselle, N. J.  
 Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Foot**

Fanco Machine Co., Kenosha, Wis.  
 Ferracute Machine Co., Bridgeton, N. J.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 Product Machine Co., 985 Housatonic Ave., Bridgeport 1, Conn.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wilson, K. R., Inc., Arcade, N. Y.

**PRESSES, Horning**

Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.

(Continued on page 350)

# L&J 50

## SERIES

### EXTRA CAPACITY WITH PRECISION TO MATCH

Large area dies are no problem when you have an L&J No. 50 Series press with its extra capacity. The exceptionally heavy frame provides maximum rigidity which enables the flanged, box-type ram to maintain precision alignment for precision jobs. The large work area will permit you to run a greater variety of work. Its dependability and tooling ease provide a new high in press efficiency.

Available in geared and non-geared models. Air clutch is available. It will pay you to get complete details now.

**SPECIFICATIONS**

**Capacity:** Model 50—50 tons, Model 50B—56 tons. **Shut Height:** 10" to 25". **Ram Stroke:** 3" to 8". **Ram Adjustment:** 3". **Ram Face:** 24" x 12". **Bolster Plate:** 36" x 24" x 2 1/4". **Throat Depth:** 12 1/2". **Opening Thru Back:** 22". **Speed:** Model 50 Non-geared—100 S.P.M., Geared—50 S.P.M. Model 50B Non-geared—95 S.P.M. Geared—46 S.P.M. **Higher speeds with air clutch.**

**Write for Bulletin L-14**

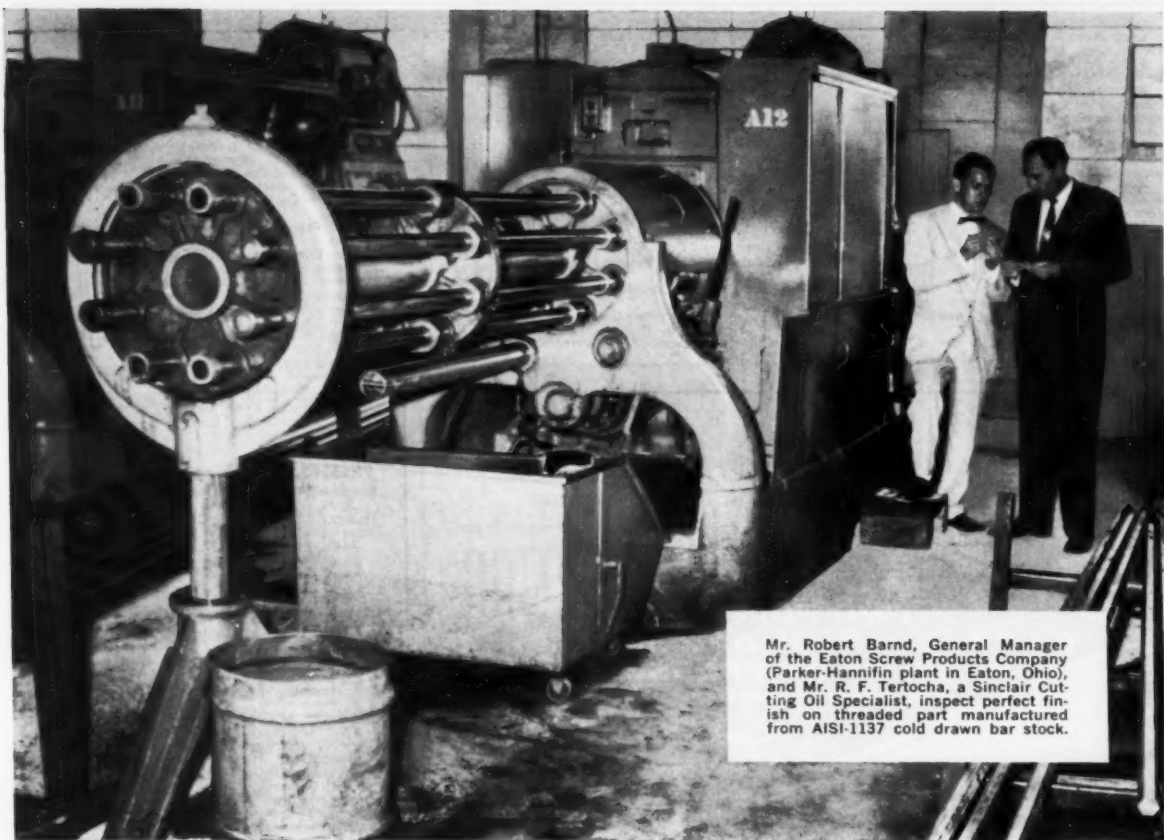
Describes L&J O.B.I. Presses. 23 Models, 14 to 90 tons, geared and non-geared. Also, 20 to 50 ton Double Crank, High Speed, Straight Side Presses.

**L&J PRESS CORPORATION**

1631 STERLING AVENUE, ELKHART, INDIANA







Mr. Robert Barnd, General Manager of the Eaton Screw Products Company (Parker-Hannifin plant in Eaton, Ohio), and Mr. R. F. Tertocha, a Sinclair Cutting Oil Specialist, inspect perfect finish on threaded part manufactured from AISI-1137 cold drawn bar stock.

## EATON REPORTS 5 ADVANTAGES WITH CLAIRO® 16...

"Why use 3 different cutting oils on your automatic screw machines *when one will do the trick?*" That's how R. F. Tertocha introduced Sinclair's new cutting oil, CLAIRO 16, to Bob Barnd. And that's when Eaton Screw Products Company started to cut their costs.

### 5 DISTINCT ADVANTAGES

After switching to CLAIRO 16, Mr. Barnd enthusiastically reported these 5 distinct advantages...

- 1** One oil for all metals which Eaton machines.
- 2** Reduction in cutting oil and lubricating oil inventory.
- 3** No contamination of non-corrosive oils with corrosive types when chips pass through chip wringer.
- 4** No need to remove cutting oil from machine reservoir when machine is set up to run either ferrous or non-ferrous parts.
- 5** Light color makes it possible for operators to see readings on calipers, scales and micrometers.

**DUAL-PURPOSE OIL** Of further importance to Eaton—this high-quality oil can also be used as a machine tool lubricant. CLAIRO 16 replaced the lubricating oil Eaton was using on a battery of 31 automatic screw machines.

You, too, can benefit from the advantages of CLAIRO 16. Contact your local Sinclair Representative or write Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. *There's no obligation.*

# SINCLAIR

CUTTING OILS AND COOLANTS

Cleveland Punch & Shear Wks. Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio  
 Ferracut Machine Co., Bridgeton, N. J.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Minster Machine Co., Minster, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 V & O Press Co., Hudson, New York  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.

#### PRESSES, Notching

Alva Allen Industries, Clinton, Mo.  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio

Ferracut Machine Co., Bridgeton, N. J.  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Minster Machine Co., Minster, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 V & O Press Co., Hudson, New York  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wales-Strippit Corp., Akron, N. Y.  
 Wilson, K. R., Inc., Arcade, N. Y.

#### PRESSES, Punching, Piercing

Alva Allen Industries, Clinton, Mo.  
 Bath Cyril Co., 32324 Aurora Rd., Solon, Ohio  
 Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
 Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Cleveland Crane & Engineering Co., Wickliffe, Ohio

Cleveland Punch & Shear Wks. Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
 Danly Machine Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.  
 Dries & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, Ill.  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Famco Machine Co., Kenosha, Wis.  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio  
 Federal Press Co., 511 Division St., Elkhart, Ind.  
 Ferracut Machine Co., Bridgeton, N. J.  
 Hannifin Corp., 510 S. Wolf Rd., Des Plaines, Ill.  
 L & J Press Corp., 1631 Sterling Ave., Elkhart, Ind.  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Minster Machine Co., Minster, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 Nilson, A. H. Machine Co., Bridgeport, Conn.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wales-Strippit Corp., Akron, N. Y.  
 Wiedemann Machine Co., 4272 Wissahickon Ave., Philadelphia 32, Pa.  
 Wilson, K. R., Inc., Arcade, N. Y.

#### PRESSES, Quenching

Gleason Wks., 1000 University Ave., Rochester 3, N. Y.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.

#### PRESSES, Rubber-Forming

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
 Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Chambersburg Engineering Co., Chambersburg, Pa.  
 Cincinnati Milling & Grinding Machines, Inc., 4701 Marburg Ave., Cincinnati 9, Ohio  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Hannifin Corp., 510 S. Wolf Rd., Des Plaines, Ill.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wilson, K. R., Inc., Arcade, N. Y.

#### PRESSES, Trimming

Alva Allen Industries, Clinton, Mo.  
 Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.  
 Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
 Chambersburg Engineering Co., Chambersburg, Pa.  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Cleveland Punch & Shear Wks. Co., 3917 St. Clair Ave., Cleveland 14, Ohio  
 Danly Machine Specialties, Inc., 2100 S. Laramie, Chicago 50, Ill.  
 Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
 Federal Machine & Welder Co., 1745 Overland Ave., N. E., Warren, Ohio  
 Federal Press Co., 511 Division St., Elkhart, Ind.  
 Ferracut Machine Co., Bridgeton, N. J.  
 Hannifin Corp., 510 S. Wolf Rd., Des Plaines, Ill.  
 Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
 L & J Press Corp., 1631 Sterling Ave., Elkhart, Ind.  
 Lake Erie Machinery Corp., 470 Woodward Ave., Buffalo 17, N. Y.  
 Minster Machine Co., Minster, Ohio  
 Niagara Machine & Tool Wks., 637 Northland Ave., Buffalo 11, N. Y.  
 Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.  
 Wilson, K. R., Inc., Arcade, N. Y.

**PROFILING MACHINES**—See Milling Machine, Die Sinking, etc.

#### PULLEYS

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.



#### Outstanding Features

- Shut height adjustment in head.
- Center drive type herringbone gears.
- Scrap cutter action on up-stroke of press.
- Cam adjustments for brake & roll feeds.
- Micro adjustment of metal travel.
- Timing of scrap cutter from 0° to 45° of up-stroke of press.
- Positive shut height lock.
- Bronze sleeve bearings replace gibs as utilized on conventional presses.

These precision presses are basically precision operating, high-speed automatic stamping presses. They have built-in precision in the same terms as the word "precision" is associated with modern machine tools. This inherent quality has been designed into these presses from the ground up.

**NO PITS REQUIRED.**

**UNBALANCED DIES can be handled without distortion.**

**FAST, ACCURATE, WILL GIVE LONG TROUBLE-FREE SERVICE and LONG DIE LIFE.**

**PRESSES UP TO 300 TON CAPACITY, AVAILABLE TO CUSTOMER PARTICULAR REQUIREMENTS.**

Write for Catalog

**ALPHA PRESS & MACHINE, INC.**

9281 Freeland Avenue • Detroit 28, Michigan



**PUMPS, Coolant and Lubricant**

Barnes, John S., Corp., Rockford, Ill.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
Graymills Co., 3705 N. Lincoln Ave., Evans-ton, Ill.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.  
Ruthman Machinery Co., 1809 Reading Rd., Cincinnati 12, Ohio  
Viking Pump Co., Cedar Falls, Iowa

**PUMPS, Hydraulic**

Barnes, John S., Corp., Rockford, Ill.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio  
Elmes Eng. Div., American Steel Foundries, 1150 Tennessee Ave., Cincinnati 29, Ohio  
Hydraulic Press Mfg. Div., Mount Gilead, Ohio  
Oilgear Co., 1569 W. Pierce St., Milwaukee, Wis.  
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.  
Vickers Incorporated, Division of Sperry Rand Corp., 1402 Oakman Blvd., Detroit, Mich.  
Viking Pump Co., Cedar Falls, Iowa  
Watson-Stillman Co., Roselle, N. J.  
Wilson, K. R., Arcade, N. Y.

**PUNCHES AND DIES**—See Dies, Blank-ing, etc.

**REAMERS, Rose, Chucking, Jobbers' Taper, Shell, Adjustable, etc.**

Barber-Colman Co., Rock and Montague, Rock-ford, Ill.  
Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Heller Tool Co., Heller Dr., Newcomerstown, Ohio  
National Twist Drill & Tool Co., & Winter Bros. Co., Rochester, Mich.  
Tomkins-Johnson Co., 617 N. Mechanic St., Jackson, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

**REELS, Stock**

National Acme Co., 170 E. 131st St., Cleveland 3, Ohio  
Nilsson, A. H. Machine Co., Bridgeport, Conn.  
U. S. Tool Co., Inc., 255 North 18th St., Amperre, N. J.

**REFRACTORS, Heat-Treating Furnaces**

Norton Co., 1 New Bond St., Worcester 6, Mass.

**RETAINING RINGS FOR BEARINGS, etc.**

Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y.

**RIVETERS, Stationary**

Brown & Sharpe Mfg. Co., 35 Promenade St., Providence 1, R. I.  
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Hannifin Corp., 510 S. Wolf Rd., Des Plaines, Ill.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
Tomkins-Johnson Co., 617 N. Mechanic St., Jackson, Mich.

**RIVETERS, Portable**

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Hannifin Corp., 510 So. Wolf Rd., Des Plaines, Ill.  
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Thor Power Tool Co., Prudential Plaza, Chi-cago 1, Ill.

**RULES, SCALES AND STRAIGHTEDGES**

—See Machinists' Small Tools

**RUST INHIBITORS**

Oakite Products, Inc., 19 Rector St., New York, N. Y.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Shell Oil Co., 50 W. 50th St., New York, N. Y.  
Stuart, D. A. Oil Co. Ltd., 2727 S. Troy St., Chicago 23, Ill.  
Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa.

**SAND BLAST EQUIPMENT**—See Blast Cleaning Equipment

**SAW BLADES, Hack, Band, Circular, Friction**

Armstrong-Blum Mfg. Co., 5700 W. Bloom-ingdale Ave., Chicago, Ill.

Circular Tool Co., Inc., 765 Allens Ave., Provi-dence 5, R. I.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Esen-Lucas Mach. Works, Philadelphia, Pa.  
Simonds Saw & Steel Co., 470 Main St., Fitch-burg, Mass.  
Starrett, The L. S. Co., Athol, Mass.  
Tannewitz Works, Grand Rapids, Mich.

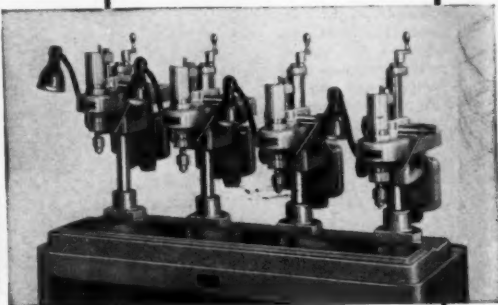
**SAW BLADE SHARPENERS**

DoAll Co., Des Plaines, Ill.  
Esen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.

**SAWING MACHINES, Abrasive Ma-chines**—See Cutting-off Saws, Abra-sive Wheel

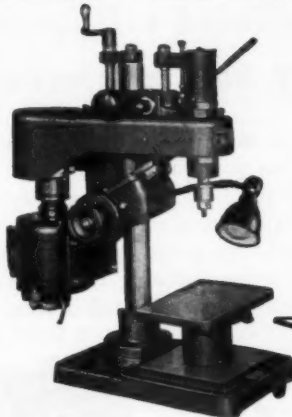
HAMILTON  
SUPER SENSITIVE, SMALL-HOLE

PRECISION  
REPEAT  
PRECISION  
DRILLING MACHINES



“for the finest work you do”

SINGLE OR MULTIPLE SPINDLES • VARIOUS CAPACITIES • WIDE RANGE OF CLEARANCES • VARIABLE SPINDLE SPEEDS • COMPANION TAPPING MACHINES



Designed and built to master the heart-breaking jobs which are so often attempted on drilling machines of “standard” accuracy.

**YOU**

will want full information!  
WE WILL SUPPLY IT

**FREE**

ask for

**BULLETIN No. 2467**

**ADDRESS**

**THE HAMILTON TOOL COMPANY**

834 South Ninth Street  
HAMILTON, OHIO

IT'S A  
**Hamilton Tool**  
USE IT WITH CONFIDENCE

# WHO

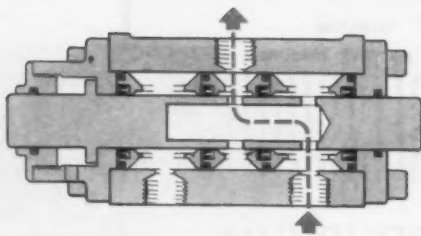
**says all control valves  
are pretty much alike?**

**This exclusive patented\***

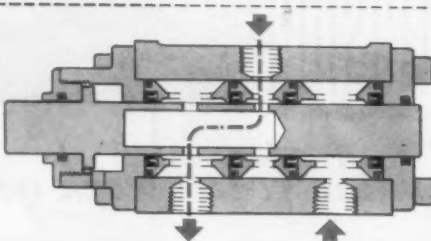
## Quick-As-Wink®

**construction**

**Plunger Right.** Air flows through the inlet—and the hollow, polished stainless steel plunger—and out to the air operated device.



**Plunger Left.** Inlet air is blocked off. Air from the air operated device is exhausted through the hollow plunger, and out the exhaust connection.



**assures users unparalleled efficiency,  
economy, dependability and satisfaction**

Quick-As-Wink Control Valves are in a class by themselves! Our exclusive patented\* valve chamber construction, that accurately positions the "O" rings and the "U" packers without mechanical pressure, meets the most exacting service requirements. No direct flow across the packings, greatly prolonging their life. No lapped joints. No metal to metal seating. Hundreds of different types and actions. Sizes from 1/4" to 4". Get full details.

\*U. S. Pat. No. 2,645,450

**Write for BULLETIN NO. 571 Today!**

## Quick-As-Wink®

AIR AND HYDRAULIC

## Control Valves



**Mfd. by C. B. HUNT & SON, INC., 1945 East Pershing St., Salem, Ohio**  
— Engineering and Sales Representatives in the Principal Cities —

352—MACHINERY, November, 1957

### SAWING MACHINES, Band

Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, Ill.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Famco Machine Co., Kenosha, Wis.  
Tannerwitz Works, Grand Rapids, Mich.

### SAWING MACHINES, Circular Blade

Consolidated Mch. Tool Div., Blossom Road, Rochester 10, N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Espin-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.

### SAWING MACHINES, Power Hack

Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, Ill.  
Chicago Pneumatic Tool Co., New York 17, N. Y.  
Homstrand, Inc., Larchmont, N. Y.  
Racine Hydraulics & Machinery Inc., Racine, Wis.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.

### SAWS, Screw-slotting—See Cutters, Milling

### SCALES

Hydroway Scales, Inc., 31302 Stephenson Hwy., Madison Hts., Mich.

### SCREW DRIVERS, STUD AND NUT SETTERS, Power

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Consolidated Mch. Tool Div., Blossom Road, Rochester 10, N. Y.  
Cross Co., 3250 Bellevue, Detroit 7, Mich.  
Errington Mech. Lab., Inc., 24 Norwood Ave., Staten Island 4, N. Y.  
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
Scully-Jones & Co., 1906 S. Rockwell St., Chicago 8, Ill.  
Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.  
Williams & Co., J. H., 400 Vulcan St., Buffalo 7, N. Y.

### SCREW MACHINES, Hand—See Lathes, Turret, Ram-type, Saddle-type

### SCREW MACHINES, Single-Spindle Automatic

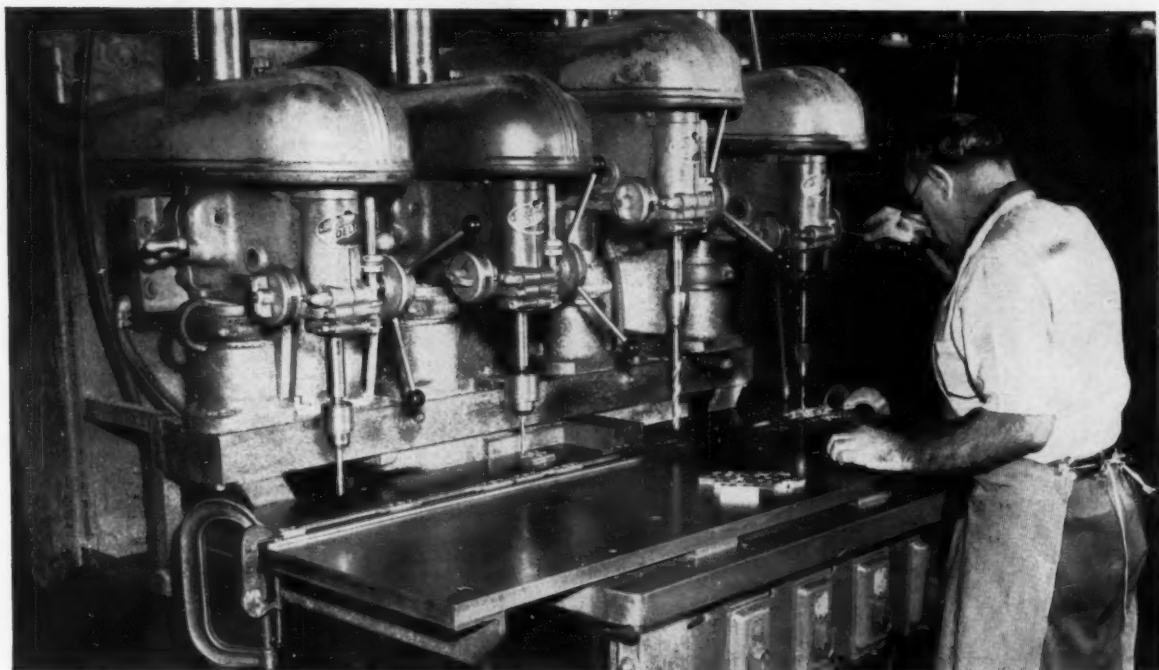
Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio  
Cone Automatic Mch. Co., Inc., Windsor, Vt.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Gear Grinding Mch. Co., 3901 Christopher St., Detroit 11, Mich.  
Gisholt Mch. Co., 1245 E. Washington Ave., Madison 10, Wis.  
Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.

### SCREW MACHINES, Multiple-Spindle Automatic

Cone Automatic Mch. Co., Inc., Windsor, Vt.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Greenlee Bros. & Co., 2136 12th St., Rockford, Ill.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Warner & Swasey, 6701 Carnegie Ave., Cleveland 3, Ohio



# ROCKWELL-BUILT **DELTA** drill presses



## ... save cost of expensive machines

for General Bronze Corp., Garden City, N. Y.

**FLEXIBILITY NEEDED**—"Producing custom ornamental metal work for architectural use calls for limited production runs and fast product output," says Joe Gafney, Plant Engineer, "and Delta drill presses give us maximum flexibility to meet these constantly changing production demands."

**PRECISION AT LESS COST**—This Delta drill press set up drills, countersinks and counterbores over 500 bronze window blocks per day, with precision that eliminates costly rejects. And stock Delta power tools provide an inexpensive way to meet peak work loads and prevent bottlenecks.

**LONG LIFE, LOW MAINTENANCE**—"We have some Delta equipment that has been in regular use for over 15 years," says Mr. Gafney, "and still performs with almost no maintenance. Rugged construction and low-cost maintenance are Delta Quality features we really appreciate."

**SEE THE ENTIRE DELTA LINE**—Get all the facts on the world's most complete line of drill presses and accessories. Compare for quality, for value—and make up your own mind. Your Delta Dealer is listed under "TOOLS" in the Yellow Pages of your telephone book.

**Send Coupon for All the Facts!**



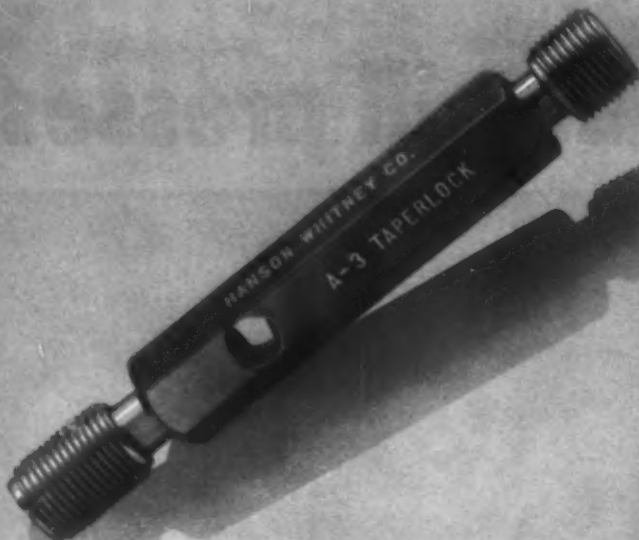
another product by  
**ROCKWELL**



Delta Power Tool Div., Rockwell Manufacturing Co.  
6141 N. Lexington Ave., Pittsburgh 8, Pa.

- ☐ Please send catalog on entire Delta Drill Press line.
- ☐ Please send booklet: Power Tools Teamed with Machine Tools.
- ☐ Please send names of my nearest Delta Dealers.

Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ County \_\_\_\_\_ State \_\_\_\_\_



## GAGES FOR TOP PRODUCTION

Hanson-Whitney has long led the field in the production of top quality Finished Taps, Hobs, Cutters, and Precision Gages. And H-W offers complete stocks and service from local distributors . . . plus home or field engineering assistance on all threading problems.

Hanson-Whitney Gages are engineered and manufactured with "single source" reliability and accuracy. H-W Limit Working Plug and Ring Gages are available in all standard sizes, National and Unified, and all special forms. H-W offers AGD Cylindrical and Thread Plug and Ring Gages, straight and tapered thread, in steel and carbide. In addition, H-W manufactures a complete line of comparator type, internal and external thread gages.

Remember, Hanson-Whitney means—Finest quality throughout the product . . . design engineering know-how based on years of experience in your field's requirements. Write for catalogs—full information.



# Hanson-Whitney

COMPANY

Division of THE WHITNEY CHAIN COMPANY  
176 BARTHOLOMEW AVE., HARTFORD 2, CONN.

TAPS : THREAD GAGES : HOBBS : CENTERING MACHINES : THREAD MILLING MACHINES AND CUTTERS

### SCREW PLATES

Greenfield Tap & Die Corp., Greenfield, Mass.  
Threadwell Tap & Die Co., 16 Arch St.,  
Greenfield, Mass.

**SCREWS, Cap, Set, Self-tapping, etc.—**  
See Bolts, Nuts and Screws

### SEALS AND RETAINERS, Oil or Grease

Crane Packing Co., 1800 Cuyler Ave., Chicago,  
Ill.  
Gits Bros. Mfg. Co., 1858 S. Kilbourn Ave.,  
Chicago, Illinois

### SEPARATORS, Magnetic

Barnes Drill Co., 814 Chestnut St., Rockford,  
Ill.  
Sundstrand Mch. Tool Co., 2531 11th St.,  
Rockford, Ill.

### SET-UP EQUIPMENT

Armstrong Bros. Tool Co., 5200 W. Armstrong  
Ave., Chicago, Ill.  
Challenge Mchry. Co., Grand Haven, Mich.  
Lufkin Rule Co., Saginaw, Mich.  
Starrett, The L. S. Co., Athol, Mass.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo  
7, N. Y.

### SHAFTS

Cumberland Steel Co., 101 Williams St., Cum-  
berland, Md.

### SHAPERS, Crank and Hydraulic

Austin Industrial Corp., 76 Mamaroneck Ave.,  
White Plains, N. Y.  
Cincinnati Shaper Co., Elam and Garrard Aves.,  
Cincinnati, Ohio  
Homstrand, Inc., Larchmont, N. Y.  
Nebel Machine Tool Corp., 3401 Central Pkwy.,  
Cincinnati 25, Ohio  
Orban, Kurt Co., Inc., 42 Exchange Place, Jer-  
sey City 2, N. J.  
Rockford Mch. Tool Co., 2500 Kishwaukee St.,  
Rockford, Ill.  
Sheldon Mch. Co., Inc., 4240-4258 N. Knox  
Ave., Chicago 41, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison  
St., South Bend, Ind.  
Western Machine Tool Works, Holland, Mich.

### SHAPERS, Vertical and Slotters

Austin Industrial Corp., 76 Mamaroneck Ave.,  
White Plains, N. Y.  
Bridgeport Mches., Inc., 500 Lindley St.,  
Bridgeport 6, Conn.  
Consolidated Mch. Tool Div., Blossom Road,  
Rochester 10, N. Y.  
Homstrand, Inc., Larchmont, N. Y.  
Morey Machinery Co., 383 Lafayette St., New  
York 3, N. Y.  
Orban, Kurt Co., Inc., 42 Exchange Place, Jer-  
sey City 2, N. J.  
Rockford Mch. Tool Co., 2500 Kishwaukee St.,  
Rockford, Ill.

### SHEARS, Alligator

Hill Acme Co., 1201 W. 65th St., Cleveland 2,  
Ohio  
Lodge & Shipley Co., The, Cincinnati 25, Ohio

### SHEARS, Rotary and Squaring

Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.  
Cincinnati Shaper Co., Hopple & Garrard, Cin-  
cinnati 25, Ohio  
Lodge & Shipley Co., The, Cincinnati 25, Ohio  
Niagara Mch. & Tool Works, 683 Northland  
Ave., Buffalo, N. Y.  
Simonds Saw & Steel Co. (Knives), 470 Main  
St., Fitchburg, Mass.

### SHEARS, Squaring

Cincinnati Shaper Co., Elam and Garrard Aves.,  
Cincinnati, Ohio  
Famco Machine Co., Kenosha, Wis.  
Lodge & Shipley Co., The, Cincinnati 25, Ohio  
Niagara Mch. & Tool Works, 683 Northland  
Ave., Buffalo, N. Y.  
Simonds Saw & Steel Co. (Blades), 470 Main  
St., Fitchburg, Mass.

**O. S. Walker offers  
a complete new line  
of permanent magnetic chucks!**



Now, from O. S. Walker, the originator of magnetic chucks, comes a completely new, full line of chucks, with the most permanent magnets ever produced! They're ceramic\*, with many times the coercive force of alloy magnets. The face is *all steel*, with no soft insulating material. These chucks offer many important advantages:—

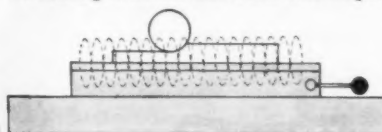
- Weight is 50% less than conventional permanent chucks; minimizes reciprocating table inertia.
- Their low, low height gives greater-than-ever machine capacity.
- Fine pole divisions give maximum holding power.
- All magnetic fields are controlled to prevent magnetization of machine table or ways.

Write for details.

\*Patent applied for.

**... perfect  
for milling, too!**

These new chucks are perfect for milling or planing due to their exclusive construction. † Cutter is constantly demagnetized as it progresses, with no fouling of cutter and work with chips!



†O. S. Walker magnets are polarized horizontally!

**O. S. WALKER** COMPANY, INC.  
WORCESTER 6, MASSACHUSETTS

*Permanent magnetic and electro-magnetic rotary and rectangular chucks,  
demagnetizers, lifting magnets, vacuum chucks.*

**SHEET METALS**—See Strip and Sheet, Ferrous, Non-ferrous

### SHIM STOCK

Laminated Shim Co., Inc., Glenbrook, Conn.  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

**SHOP FURNITURE**—See Furniture, Shop

### SLITTING MACHINES, Rotary

Bliss Co., E. W., Canton, Ohio  
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.  
Yoder Co., 5504 Walworth Ave., Cleveland 2, Ohio

**SLOTTERS**—See Shapers, Vertical and Slotters

**SOCKETS**—See Drill Sleeves and Extension Holders

### SOLENOIDS

Allen-Bradley Co., 1331 S. 1st St., Milwaukee 4, Wis.  
Barnes, John S. Corp., Rockford, Ill.  
General Electric Co., Schenectady, N. Y.  
National Acme Co., 170 E. 131st St., Cleveland 3, Ohio  
Vickers, Inc., Detroit 32, Mich.

### SPECIAL MACHINERY AND TOOLS

Axelson Mfg. Co., 6160 S. Boyle Ave., Los Angeles 58, Calif.  
Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Baldwin-Lima-Hamilton Corp., Eddystone Div., Philadelphia 42, Pa.  
Baldwin-Lima-Hamilton Corp., Lima Hamilton Div., Hamilton, Ohio  
Baker Bros., Inc., Sta. F., P.O. Box 101, Toledo 10, Ohio  
Bath, Cyril Co., Aurora & Solon Road, Solon, Ohio  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Barnes, W. F. & John Co., 201 S. Water St., Rockford, Ill.  
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
Bethlehem Steel Co., Bethlehem, Pa.  
Bigram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.  
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.  
Blanchard Mch. Co., 64 State St., Cambridge, Mass.  
Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio  
Buhr Mch. Tool Co., 835 Green St., Ann Arbor, Mich.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Cincinnati Milling Mch. Co., Oakley, Cincinnati 9, Ohio  
Colonial Broach & Machine Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
Columbus Die-Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Coulter, James, Machine Co., Bridgeport 5, Conn.  
Cross Co., Detroit, Mich.  
Erie Foundry Co., Erie, Pa.  
Espin-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
Federal Machine & Welder Co., Overland Ave., Warren, Ohio  
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill.  
Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill.  
Hartford Special Mchry. Co., 287 Homestead Ave., Hartford, Conn.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
Hydraulic Press Mfg. Co., Mount Gilead, Ohio  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kingsbury Mch. Tool Corp., Keene, N. H.  
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
Le Maire Tool & Mfg. Co., Dearborn, Mich.  
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
Modern Industrial Engrg. Co., 14230 Birwood, Detroit 4, Mich.  
Moline Tool Co., 102 20th St., Moline, Ill.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio  
National Acme Co., 170 E. 131st St., Cleveland, Ohio  
National Automatic Tool Co., Inc., S. 7th and N. Sts., Richmond, Ind.  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
National Twist Drill & Tool Co., Rochester, Mich.  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.  
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Oilgear Co., 1569 W. Pierce St., Milwaukee, Wis.  
Robbins, Omar E. Co., 24800 Plymouth Rd., Detroit 39, Mich.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati, Ohio  
Sundstrand Mch. & Tool Co., 2531 11th St., Rockford, Ill.  
Universal Engrg. Co., Frankenthuth 2, Mich.  
Verson Allsteel Press Co., 93rd St. & S. Kenwood Ave., Chicago, Ill.

(Continued on page 358)

These refinements  
on Ferracute's  
new 110-ton  
**O.B.I.**  
mean more  
profitable production

- 1 Box-type ram construction, gibbed front and back.
- 2 Air-operated, electrically controlled, interconnected clutch and brake.
- 3 Hydraulic inclining mechanism.
- 4 Bed arranged to accommodate die cushion.
- 5 Ram, air counterbalanced.
- 6 Floor-level, one-point lubrication.
- 7 Two lifting eyes mounted in press frame.

**FERRACUTE**

Write for complete information.

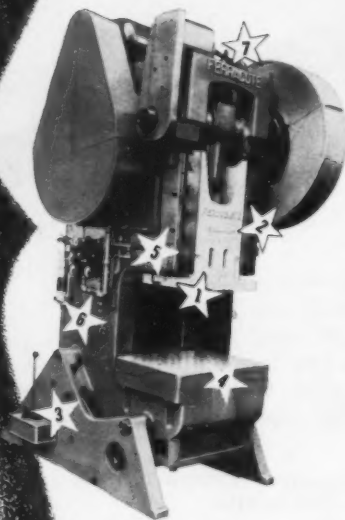
**FERRACUTE MACHINE CO.**

469 East Commerce Street, Bridgeton, N. J.

Manufacturers of Power Presses.

Press Brakes and Special Machinery

"Other sizes from 32 ton to 200 ton"

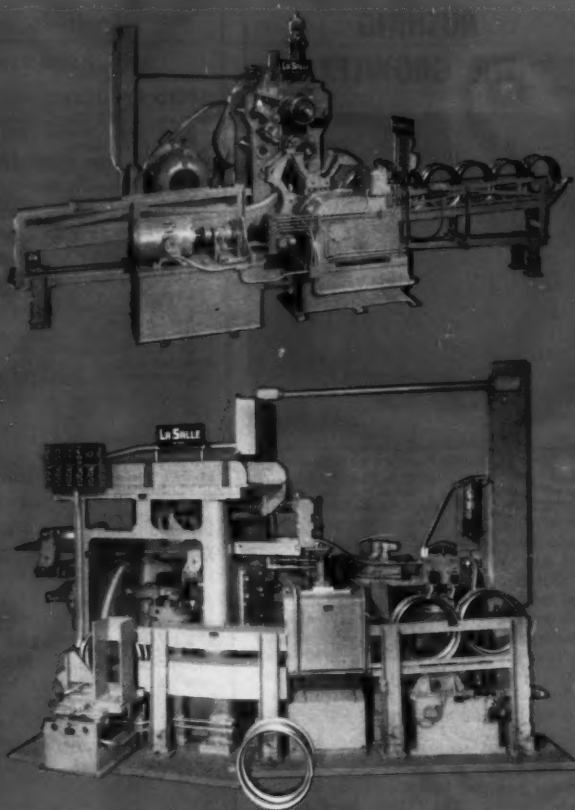




# La Salle

## *Wheel Rim-omatic*

**new  
wheel rim  
automation  
line**



**Engineered to give you machine tool precision,  
High Speed production and complete automation**

### **3 Interlocked Forming Machines**

It's a series of three forming machines, with automatic load and unload mechanisms, electrically interlocked to form a continuous line. It's designed and built for the volume production of precision formed wheel rims.

### **Self-Contained**

The Self-contained units are completely wired, with many built-in features, and are ready for immediate use. You merely connect the power lines, once the machine has been set in position—and it operates automatically.

### **LaSalle Shuttle Transfer**

An automatic (LaSalle) shuttle transfer mechanism moves the wheel rims to the load position on the final sizing press, from a vertical plane in the third forming machine, to a horizontal plane in the final sizing press.

### **Automatic Features**

The wheel rims progress through this new precision machine—through the 3 interlocked forming units—as a continuous automatic operation. EVERY OPERATION IS COMPLETELY AUTOMATIC! Here's a simplified version of what takes place along the way in this new "LaSalle Wheel Rim-omatic"—after proper channelling; proper cycling; proper indexing; and, precision forming, the finished wheel rims are fed from the final sizing press—automatically.

### **Production Plus**

This new LaSalle wheel rim automation line, already in operation in a manufacturing division, of one of the Big 3, where precision and high production is a must, has proven to be a real production asset.

Requests for information honored promptly.

# La Salle *tool, inc.*

**ENGINEERING & BUILDING  
SPECIAL MACHINERY**

**3840 EAST OUTER DRIVE • DETROIT 34, MICHIGAN**

For more information fill in page number on Inquiry Card, on page 221

MACHINERY, November, 1957—357

## RUSHING THE GROWLER

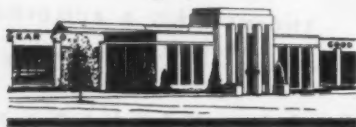


Those were the days—down to the corner saloon, at the side entrance, you could bring a pail, bucket, or pitcher, and have it filled with cool draft beer—that was "rushing the growler," a real treat back in 1907. If you preferred you could buy good 7-year old bourbon whiskey by mail order for only \$3.20 for four full quarts. Or if you lived in a "dry" area, you drank patent medicine—for your "health"—that might contain up to 47% alcohol.

Dreaming of the "good old days" is a popular pastime, but it's not at all entirely realistic. There have been many changes since 1907 that we tend to lose sight of; diversions in 1907 were fewer than today—and there was less time to be diverted in! Products have changed too—and most have changed for the better. Gears are an excellent example; the progress in the design, quality and manufacture of gears in the past 50 years has been remarkable. This progress is continuing today at an ever-increasing tempo, providing an important reason for choosing your custom gear source with care—for choosing a firm with demonstrable ability to keep in the forefront of this progress. A firm, in short, with a record like Cincinnati Gear.

### THE CINCINNATI GEAR CO. CINCINNATI 27, OHIO

Fifty Years of "Gears—Good Gears Only"



Waltham Machine Works, Newton St., Waltham, Mass.  
Wicaco Machine Corp., Wayne Junction, Philadelphia, Pa.

#### SPEED REDUCERS

Barnes, John S. Corp., Rockford, Ill.  
Boston Gear Works, 320 Main St., North Quincy 71, Mass.  
Brook Foote Gear Works, 1309 So. Cicero Ave., Chicago 50, Ill.  
Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, Ohio  
Cone Drive Gear Div., 7171 E. McNichols Rd., Detroit 12, Mich.  
DoAll Co., Des Plaines, Ill.  
Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
Horsburgh & Scott Co., 5114 Hamilton, Cleveland, Ohio  
James, D. O., Gear Mfg. Co., 1140 W. Monroe St., Chicago 7, Ill.  
Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.  
Reliance Elec. & Engrg. Co., 1200 Ivanhoe Rd., Cleveland 10, Ohio

#### SPINDLES, Machine

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
National Automatic Tool Co., S. 7th and N. St., Richmond, Ind.  
Standard Electrical Tool Co., 2488-90 River Road, Cincinnati, Ohio  
Wadell Equip. Co., Clark, N. J.

#### SPRAYING EQUIPMENT, Metal

Metallizing Engrg. Co., Westbury, N. Y.

#### SPROCKETS—See Gears, Cut

#### STAMPINGS, Sheet Metal

Dayton Rogers Mfg. Co., Minneapolis, Minn.  
Laminated Shim Co., Inc., Glenbrook, Conn.  
Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

#### STEEL ALLOYS—See Alloy Steels

#### STEEL, Cold Rolled, Stainless, High-speed, Tool, etc.

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Carpenter Steel Co., 105 W. Bern St., Reading, Pa.  
Columbia Tool Steel Co., Chicago Hts., Ill.  
Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 30, Pa.  
Cumberland Steel Co., 101 Williams St., Cumberland, Md.  
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
Timken Roller Bearing Co., Canton, Ohio  
U. S. Steel Corp. (American Steel & Wire Co.), Div., 436 7th Ave., Pittsburgh, Pa.  
Vanadium-Alloys Steel Co., Latrobe, Pa.  
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

#### STEEL DISTRIBUTORS

Ryerson, Jos. T., & Son, 16th & Rockwell St., Chicago 8, Ill.

#### STOCKS AND DIES

Cyril Bath Co., Salon, Ohio  
DoAll Co., Des Plaines, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
Landis Mch. Co., Waynesboro, Pa.  
Threadwell Tap & Die Co., Greenfield, Mass.

#### STRAIGHTEDGES—See Machinists' Small Tools

#### STRAIGHTENERS, Flat Stock and Wire

Bliss Co., E. W., Canton, Ohio  
Niagara Mch. & Tool Wks., 637-697 Northland Ave., Buffalo 11, N. Y.  
Nilson, A. H. Machine Co., Bridgeport, Conn.  
U. S. Tool Co., Inc., 255 North 18th St., Amherst, N. J.  
Verson Allsteel Press Co., 9309 S. Kenwood Ave., Chicago 19, Ill.

#### STRIP AND SHEET, Ferrous

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Carpenter Steel Co., 105 W. Bern St., Reading, Pa.  
Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 30, Pa.  
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.  
U. S. Steel Corp. (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp., Div., Columbia Steel Co., Div., Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa.

#### STRIP AND SHEET, Non-ferrous

American Brass Co., 25 Broadway, New York, N. Y.  
Bethlehem Steel Co., Bethlehem, Pa.  
Bridgeport Brass Co., Bridgeport, Conn.  
New Jersey Zinc Co., 160 Front St., New York, N. Y.  
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.

#### STRUCTURAL SHAPES

Bethlehem Steel Co., Bethlehem, Pa.  
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.  
Ryerson, Joseph T. & Son, Inc., 16th & Rockwell Sts., Chicago 8, Ill.  
U. S. Steel Corp., 525 Wm. Penn Pl., Pittsburgh 30, Pa.

#### STUD SETTERS—See Screwdrivers, etc.

#### SUPERFINISHING EQUIPMENT

Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.

#### SURFACE PLATES

Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
Bryant Chucking Grinder Co., Springfield, Vt.  
Challenge Mch. Co., Grand Haven, Mich.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
DoAll Co., Des Plaines, Ill.  
South Bend Lathe Wks., South Bend 22, Ind.

#### SWITCHES, Limit

Allen-Bradley Co., 1331 So. 1st St., Milwaukee, Wis.

#### TACHOMETERS—See Indicators, Speed

#### TAP HOLDERS

Brown & Sharpe Mfg. Co., 235 Promenade St., Providence 1, R. I.  
Cleveland Automatic Mch. Co., 4932 Beech St., Cincinnati 12, Ohio  
Etco Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
National Automatic Tool Co., S. 7th and N. Sts., Richmond, Ind.  
Scully-Jones & Co., 1906 Rockwell St., Chicago 8, Ill.

**TAPPING HEADS**

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio  
 Baice-Crane Co., Toledo, Ohio  
 Davis Boring Tool Div., Giddings & Lewis Mch. Tool Co., Fond du Lac, Wis.  
 Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.  
 Etico Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.  
 Homestrand Inc., Larchmont, N. Y.  
 LaSalle Tool Co., Inc., 3480 E. Outer Drive, Detroit 34, Mich.  
 Leland-Gifford Co., 1425 Southbridge St., Worcester, Mass.  
 National Automatic Tool Co., S. 7th and N Sts., Richmond, Ind.  
 Thriftmaster Products Corp., 1076 N. Plum St., Lancaster, Pa.

**TAPPING MACHINES**

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio  
 Boush Machine Tool Co., 15 Wason Ave., Springfield 7, Mass.  
 Cincinnati Bickford Div. of Giddings & Lewis Mch. Tool Co., Oakley, Cincinnati 9, Ohio  
 Chicago Pneumatic Tool Co., New York 17, N. Y.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 Elox Corp. of Mich., 1830 Stephenson Highway, Royal Oak 3, Mich.  
 Etico Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.  
 Govro-Nelson Co., 1831 Antoinette St., Detroit 8, Mich.  
 Hamilton Tool Co., 834 S. 9th St., Hamilton, Ohio  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
 Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.  
 Kaufman Manufacturing Co., Manitowac, Wis.  
 Kingsbury Mch. Tool Corp., Keene, N. H.  
 Landis Mch. Co., Waynesboro, Pa.  
 LaSalle Tool Inc., 3840 E. Outer Drive, Detroit 34, Mich.  
 Le Maire Tool & Mfg. Co., Dearborn, Mich.  
 Moline Tool Co., 102 20th St., Moline, Ill.  
 National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.  
 Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio  
 Western Machine Tool Works, Holland, Mich.

**TAPS, Hand, Machine Screw, Pipe, etc.**

DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Hanson-Whitney Co., 169 Bartholomew Ave., Hartford 3, Conn.  
 Hy-Pro Tool Co., New Bedford, Mass.  
 Sheffield Corp., 721 Springfield St., Dayton 1, Ohio  
 Threadwell Tap & Die Co., Greenfield, Mass.  
 Winter Bros. Co., Rochester, Mich.

**TAPS, Collapsing**

Geometric Tool Co. Div., Greenfield Tap & Die Corp., New Haven 15, Conn.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Landis Mch. Co., Waynesboro, Pa.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio  
 Sheffield Corp., 721 Springfield St., Dayton 1, Ohio

**THREAD CUTTING MACHINES**

Coulter, James, Machine Co., 629 Railroad Ave., Bridgeport 5, Conn.  
 Davis & Thompson Co., 4460 W. 124th St., Milwaukee 10, Wis.  
 Errington Mach. Lab. Inc., 24 Norwood Ave., Staten Island 4, N. Y.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
 Landis Mch. Co., Waynesboro, Pa.  
 Sheffield Corp., Dayton 1, Ohio

**THREAD CUTTING TOOLS**

Armstrong Bros. Tool Co., 5200 Armstrong Ave., Chicago, Ill.  
 Coulter, James, Machine Co., 629 Railroad Ave., Bridgeport 5, Conn.  
 Geometric Tool Co. Div., Greenfield Tap & Die Corp., New Haven 15, Conn.  
 Hanson-Whitney Co., 169 Bartholomew Ave., Hartford 3, Conn.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio  
 Landis Mch. Co., Waynesboro, Pa.  
 Sheffield Corp., 721 Springfield St., Dayton 1, Ohio

**THREAD ROLLING DIES—See Dies, Thread Rolling****THREAD ROLLING EQUIPMENT**

Hartford Special Machinery Co., 287 Homestead Ave., Hartford, Conn.  
 Landis Machine Co., Waynesboro, Pa.  
 National Acme Co., 170 E. 131st St., Cleveland 3, Ohio  
 National Machinery Co., Tiffin, Ohio  
 Reed Rolled Thread Die Co., P. O. Box 350, Worcester 1, Mass.  
 Sheffield Corp., Dayton 1, Ohio  
 V & O Press Co., Hudson, New York

**TOOL CONTROL BOARDS**

Cross Co., 3250 Bellevue, Detroit 7, Mich.  
 Royal Design & Mfg. Inc., 4133 E. 10 Mile Rd., Centerline, Mich.  
 Scully-Jones Co., 1906 S. Rockwell St., Chicago 8, Ill.

**TOOL HOLDERS**

Apex Tool & Cutter Co., Inc., 235 Canal St., Shelton, Conn.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 Bridgeport Mch. Co., Inc., 500 Lindley St., Bridgeport 6, Conn.  
 Cleveland Automatic Mch. Co., 4932 Beech St., Cincinnati 12, Ohio  
 Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, Ohio  
 Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa.  
 Eclipse Counterbore Co., 1600 Bonner Ave., Ferndale, Mich.  
 Kennametal Inc., Latrobe, Penna.  
 Lovejoy Tool Co., Inc., Springfield, Vt.

Metal Carbides Corp., 6001 Southern Blvd., Youngstown 12, Ohio  
 R & L Tools, 1825 Bristol St., Philadelphia 40, Pa.  
 Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
 Vascoloy-Ramet Corp., Waukegan, Ill.  
 Walton Co., Hartford 10, Conn.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**TOOL MATERIAL, Cast Non-Ferrous Alloy**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 Haynes Stellite Co., 725 So. Lindsay St., Kokomo, Ind.  
 Lovejoy Tool Co., Inc., Springfield, Vt.  
 Vascoloy-Ramet Corp., Waukegan, Ill.

**TOOL MATERIAL, Cemented Carbide**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Apex Tool & Cutter Co., Inc., 235 Canal St., Shelton, Conn.  
 Armstrong Bros. Tool Co., 5213 W. Armstrong Ave., Chicago 30, Ill.  
 Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Kennametal, Inc., Latrobe, Pa.  
 Lovejoy Tool Co., Inc., Springfield, Vt.  
 Metal Carbides Corp., Youngstown 12, Ohio  
 Vascoloy-Ramet Corp., Waukegan, Ill.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

**TOOL MATERIAL, Ceramic**

Metal Carbides Corp., Youngstown 12, Ohio  
 Norton Co., 1 New Bond St., Worcester 6, Mass.  
 Vascoloy-Ramet Corp., Waukegan, Ill.

## FRICION SAWING STEEL, ETC.

with

# Tannewitz

### HIGH SPEED BAND SAWS

**IS EXCEEDINGLY FAST,  
SMOOTH, INVOLVES SO  
LITTLE DOWN-DRAW  
THAT FORMED PARTS  
CAN READILY BE CUT  
WITHOUT ANY REST.**

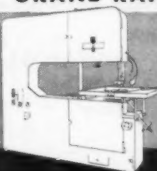


Tremendous time and cost savings, in cutting sheet steel, formed or flat, trimming malleable and steel castings and similar operations, are available to you with these machines.

Get the facts. Ask for FREE copy of "FRICION SAWING".

## The TANNEWITZ WORKS

GRAND RAPIDS, MICHIGAN ☎ GL 6-1729



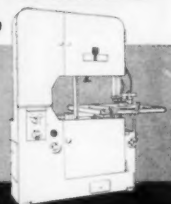
### TANNEWITZ DIE-SAWS

24", 36", 48", 60" CAPACITIES

for CONTOUR SAWING, FILING, POLISHING

The smoothest, fastest, most trouble-free Die Saws on the market. Write for bulletin.

**SAWING MACHINERY SPECIALISTS**



**TOOL MATERIAL, High-Speed Steel**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Apex Tool & Cutter Co., Inc., 235 Canal St.,  
Shelton, Conn.  
Armstrong Bros. Tool Co., 5213 W. Armstrong  
Ave., Chicago 30, Ill.  
Carpenter Steel Co., Reading, Pa.  
Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland 14, Ohio  
Crucible Steel Co. of America, Oliver Bldg.,  
Pittsburgh 30, Pa.  
Lovejoy Tool Co., Inc., Springfield, Vt.  
Vanadium Alloys Steel Co., Latrobe, Pa.

**TRACING ATTACHMENTS**

American Tool Works Co., Pearl and Eggleston  
Aves., Cincinnati 2, Ohio.  
Atlas Press Co., Kalamazoo, Mich.  
G & L and Hypro Div., Giddings & Lewis Ma-  
chine Tool Co., Fond du Lac, Wis.  
Gisholt Mch. Co., 1245 E. Washington Ave.,  
Madison 10, Wis.  
Gorton Mch. Co., 1321 Racine St., Racine, Wis.  
Jones & Lamson Mch. Co., 512 Clinton St.,  
Springfield, Vt.  
Sidney Mch. Tool Co., Sidney, Ohio  
Wales-Strippit Co., Akron, N. Y.  
Warner & Swasey, 5701 Carnegie Ave., Cleve-  
land 3, Ohio

**TRANSFER MACHINES, Automatic—**

See Multiple-Station Machines

**TRANSMISSION, Variable Speed**

Allis Chalmers Mfg. Co., Milwaukee, Wis.  
Barnes, John S. Corp., Rockford, Ill.  
Boston Gear Wks., Quincy, Mass.  
Cleveland Worm & Gear Co., 3249 E. 80th St.,  
Cleveland 4, Ohio  
Oilgear Co., 1569 W. Pierce St., Milwaukee,  
Wis.  
Reliance Electric & Engrg. Co., 1047 Ivanhoe  
Rd., Cleveland 10, Ohio  
Vickers, Inc., Detroit 32, Mich.

**TRUCKS, Material Handling**

Hamilton Tool Co., 834 So. 9th St., Hamilton,  
Ohio

**TUBE-FLANGING MACHINES**

Grant Mfg. & Mch. Co., 90 Silliman Ave.,  
Bridgeport 5, Conn.  
Niagara Mch. & Tool Wks., 637-697 Northland  
Ave., Buffalo 11, N. Y.

**TUBE FORMING AND WELDING  
MACHINES**

Yoder Co., 550 Walworth Ave., Cleveland,  
Ohio

**TUBE MILLS**

Yoder Co., 550 Walworth Ave., Cleveland,  
Ohio

**TUBING, Non-ferrous**

American Brass Co., 25 Broadway, New York,  
N. Y.  
Mueller Brass Co., Port Huron 34, Mich.  
Revere Copper & Brass Inc., 230 Park Ave.,  
New York, N. Y.  
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell  
Sts., Chicago 18, Ill.

**TUBING, Steel**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Babcock & Wilcox Co., Beaver Falls, Pa.  
Carpenter Steel Co., Reading, Pa.  
Crucible Steel Co. of America, Henry W.  
Oliver Bldg., Melon Square, Pittsburgh 22,  
Pa.

National Tube Div., U. S. Steel Corp., 525 Wm.  
Penn. Place, Pittsburgh, Pa.  
Revere Copper & Brass, Inc., 230 Park Ave.,  
New York 17, N. Y.  
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell  
Sts., Chicago 18, Ill.  
Timken Roller Bearing Co., Canton, Ohio

**TUBE & PIPE CUTTING-OFF MACHINES**

Grieder Industries, Inc., Bowling Green, Ohio

**ULTRASONIC MCH. TOOLS**

Sheffield Corp., Dayton 1, Ohio

**VALVE CONTROLS**

Barnes, John S. Corp., Rockford, Ill.  
Logansport Mch. Co., Inc., Logansport, Ind.  
Philadelphia Gear Works (Motorized), Erie Ave.  
and G St., Philadelphia, Pa.  
Vickers, Inc., Detroit 32, Mich.

**VALVES, Air**

Hannifin Corp., 510 S. Wolf Rd., Des Plaines,  
Ill.  
Hunt, C. B., & Son, Inc., 1911 E. Pershing St.,  
Salem, Ohio  
Hydraulic Press Mfg. Div., Mt. Gilead, Ohio  
Logansport Mch. Co., Inc., Logansport, Ind.  
Mead Specialties Co., 4114 N. Knox Ave., Chi-  
cago 41, Ill.  
Ross Operating Valve Co., 110 E. Golden Gate  
Ave., Detroit 3, Mich.  
Schrader's Son, A. Y., 470 Vanderbilt Ave.,  
Brooklyn 38, N. Y.  
Skinner Chuck Co., 95 Edgewood Ave., New  
Britain, Conn.  
Tomkins-Johnson Co., 617 N. Mechanic St.,  
Jackson, Mich.

**VALVES, Hydraulic**

Barnes, John S. Corp., Rockford, Ill.  
Denison Engrg. Co., 1160 Dublin St., Columbus  
16, Ohio  
Elmes Eng. Div., American Steel Foundries,  
1150 Tennessee Ave., Cincinnati 29, Ohio  
Hunt, C. B., & Son, 1911 E. Pershing St.,  
Salem, Ohio  
Hydraulic Press Mfg. Div., Mount Gilead, Ohio  
Logansport Mch. Co., Inc., 810 Center Ave.,  
Logansport, Ind.  
Oilgear Co., 1569 W. Pierce St., Milwaukee,  
Wis.  
Vickers Incorporated, Division of Sperry Rand  
Corp., 1402 Oakman Blvd., Detroit, Mich.  
Watson-Stillman Co., Roselle, N. J.

**VERNIERS—See Calipers, Vernier;  
Gages, Vernier****VICES, Machine**

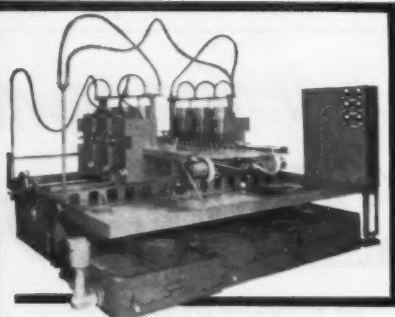
Bridgeport Mchcs., Inc., 500 Lindley St.,  
Bridgeport 6, Conn.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling & Grinding Mchcs., Inc.,  
4701 Marburg Ave., Cincinnati 9, Ohio  
Cincinnati Milling Mch. Co., Oakley, Cincinnati  
9, Ohio  
Delta Power Tool Div., Rockwell Mfg. Co.,  
Bridgport 6, Conn.  
Logansport Machine Co., Inc., 810 Center  
Ave., Logansport, Ind.  
Modern Mch. Tool Co., 2005 Losey Ave.,  
Jackson, Mich.  
Producto Mch. Co., 990 Housatonic Ave.,  
Bridgeport, Conn.  
Universal Engineering Co., Frankenmuth 2,  
Mich.  
Wesson Co., 1220 Woodward Hts. Blvd., De-  
troit 20, Mich.

(Continued on page 362)

**Proved  
in  
Performance  
RUTHMAN  
GUSHER  
COOLANT PUMPS**



MODEL  
UL 7120



*Illustrated is a Sun Glass Grinding  
Machine made by Sun Tool &  
Machine Co. and equipped with  
a Gusher Coolant Pump.*

**GUSHER COOLANT PUMPS GIVE YOU—**

**Efficient Operation.** Gusher Pumps are always primed,  
you get split-second coolant delivery.

**Long Life.** Simply designed with fewer parts, Gusher  
Pumps are precision built of the best materials.

**Minimum Maintenance Cost.** Pre-lubricated ball-bear-  
ings require no further attention. Gusher Pumps require  
no packing.

**Write today for Catalog  
MACHINERY CO.**

- COOLANT PUMPS
- CIRCULATORS • AGITATORS
- MOLTEN METAL PUMPS

Cincinnati, Ohio

1807 Reading Rd.

THE  
**Ruthman**



# LOOK to Logan

**GET GREATER VERSATILITY IN YOUR POWER OPERATIONS**

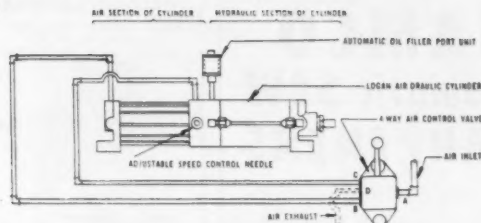
... **SPEED PRODUCTION**

... **CUT COSTS**

Logan Air-Draulic cylinders and circuit components offer a complete package unit to meet a wide range of operations. Logan Air-Draulic cylinders combine the fast-acting, economical low-pressure operation of air with the smooth, uniform controlled regulation of oil.

MEMBER: Natl. Mech. Tool Builders' Assn.; Natl. Fluid Power Assn.

**SEND FOR FREE "LOGAN CALCULATOR"**



## LOGANSPOUT MACHINE CO., INC.

810 CENTER AVENUE, LOGANSPOUT, INDIANA

**PLEASE SEND COPY OF CATALOG:**

- |  |   |  |  |
|--|---|--|--|
| <input type="checkbox"/> Facts of Life                 | <input type="checkbox"/> 100-5 Logan-square Cyls.   | <input type="checkbox"/> 200-1 Hyd. Power Units      | <input type="checkbox"/> 200-4 and 200-7 Hyd. Valves |
| <input type="checkbox"/> 100-1 Air Cyls.               | <input type="checkbox"/> 100-5-1 Ultra-mation Cyls. | <input type="checkbox"/> 200-2 Rotocast Hyd. Cyls.   | <input type="checkbox"/> 200-6 Super-Matic Cyls.     |
| <input type="checkbox"/> 100-2 Mill-Type Air Cylinders | <input type="checkbox"/> 51 Presses                 | <input type="checkbox"/> 200-3 750 Series Hyd. Cyls. | <input type="checkbox"/> 70-1 Chucks                 |
| <input type="checkbox"/> 100-3 Air-Draulic Cylinders   | <input type="checkbox"/> 62 Sure-Flow Pumps         |  | <input type="checkbox"/> ABC Booklet                 |
| <input type="checkbox"/> 100-4 Air Valves              |   |  | <input type="checkbox"/> Circuit Rider               |

**TO:**

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

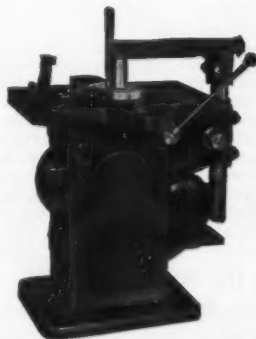
ADDRESS \_\_\_\_\_

## DAVIS KEYSEATERS

**QUICK, LOW COST OPERATION**

Is made possible by the Davis tilting table, which permits even work tapering as much as 3" per foot to be set up and cut quickly. And Davis multiple tooth cutters make quick work of all keyways up to 1" in width.

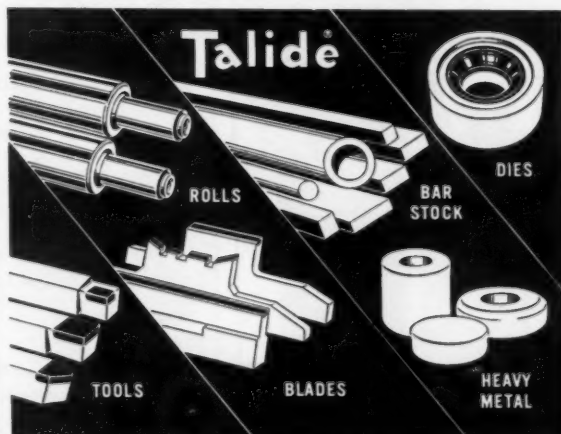
Let us work out set-ups to speed up your production.



Write for Bulletin

**DAVIS  
KEYSEATER  
COMPANY**

405 EXCHANGE ST.  
ROCHESTER 8, N. Y.



## HARDEST MAN-MADE METAL!

• New, improved TALIDE METAL is uniform in quality—gives top performance on ALL cutting, drawing and wear-resistant applications. Write for Catalog 56-G. METAL CARBIDES CORP., Youngstown 12, Ohio.



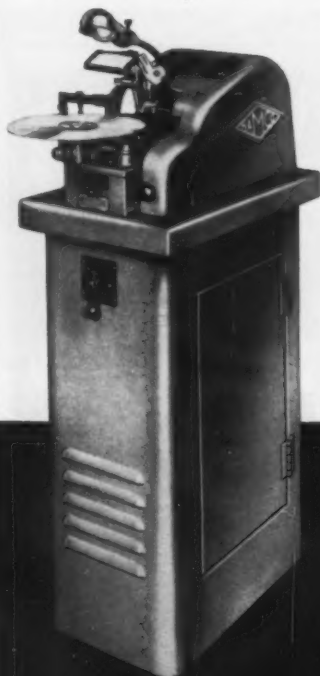
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS  
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS  
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

**YOU NEVER  
SAW SUCH  
SAVINGS**

## HAMCO Automatic SAW SHARPENERS

Quick, easy set-ups and rapid indexing now make it possible to sharpen all circular metal cutting saws from 1/2" to 14" diameters . . . from finest teeth up to 2 per inch inclusive.

**WRITE TODAY**  
for complete details  
and **FREE** literature



**HAMCO MACHINES**

93 MT. HOPE AVENUE  
ROCHESTER 20, N. Y.

### WELDING EQUIPMENT, Arc

Air Reduction Sales Co., 150 E. 42nd St., New York 17, N. Y.  
Lincoln Electric Co., 22801 St. Clair Ave., Cleveland, Ohio  
Linde Co., New York 17, N. Y.

### WELDING EQUIPMENT, Gas

Air Reduction Sales Co., 150 E. 42nd St., New York 17, N. Y.  
Linde Co., New York 17, N. Y.

### WELDING EQUIPMENT, Resistance

Eisler Engrg. Co., Inc., 750 South 13th St., Newark, N. J.  
Federal Mch. & Welder Co., Warren, Ohio

### WELDING POSITIONERS

Eisler Engrg. Co., Inc., 750 South 13th St., Newark, N. J.

### WELDMENTS

Bliss, E. W. Co., Canton, Ohio  
Mahon, R. C. Co., Detroit 34, Mich.  
Verson Allsteel Press Co., 93rd St. & S. Kenwood Ave., Chicago, Ill.

### WIPERS

Scott Paper Co., Chester, Pa.

### WIRE

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)  
Bethlehem Steel Co., Bethlehem, Pa.  
Carpenter Steel Co., 105 W. Bern St., Reading, Pa.  
Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Square, Pittsburgh 22, Pa.  
U. S. Steel Corp., (American Steel & Wire Co. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co., Div.) 436 7th Ave., Pittsburgh, Pa.

### WIRE FORMING MACHINES

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Eisler Engrg. Co., Inc., 750 South 13th St., Newark, N. J.  
Nilson, A. H., Machine Co., Bridgeport, Conn.  
U. S. Tool Co., Inc., 255 North 18th St., Amper, N. J.

### WOODWORKING MACHINES

Atlas Press Co., Kalamazoo, Mich.  
Delta Power Tool Div., Rockwell Mfg. Co., Pittsburgh, Pa.  
Greaves Mch. Tool Div., 2011 Eastern Ave., Cincinnati 2, Ohio  
Greenlee Bros. & Co., 2136 - 12th St., Rockford, Ill.  
Onsrud Machine Works, Inc., Niles, Ill.

### WRENCHES, Allen, End, Socket, Adjustable, etc.

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn.  
Armstrong Bros. Tool Co., 5213 W. Armstrong Ave., Chicago, Ill.  
Chicago Pneumatic Tool Co., New York 17, N. Y.  
Standard Pressed Steel Co., Jenkintown, Pa.  
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

### WRENCHES, Power Chuck

Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.

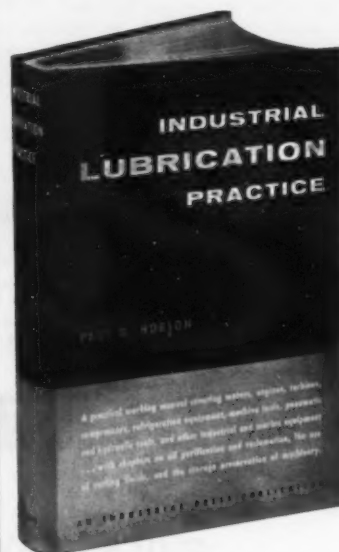
### WRENCHES, Torque

LaSalle Tool, Inc., 3480 E. Outer Drive, Detroit 34, Mich.

**ANSWERS YOUR  
QUESTIONS ON**

## INDUSTRIAL LUBRICATION PRACTICE

This book is a guide to sound lubricating practice and its application to cost-saving machine operation and maintenance, and intelligent troubleshooting. It provides valuable information for all who are responsible for the trouble-free, efficient operation of machinery, mechanical equipment and the prime movers which drive it.



**534 Pages  
167 Illustrations  
\$8.00**

In Canada or overseas, \$8.95

Send for your copy of **INDUSTRIAL LUBRICATION PRACTICE** today. In one convenient volume it will give you clear-cut, authoritative answers to many of your most perplexing problems. Order directly from the publisher, and the book will be sent immediately. You may return it within five days if you do not find it completely satisfactory. If you send payment in full with your order we pay the postage. Same return privilege applies, of course.

**THE INDUSTRIAL PRESS**  
93 Worth Street  
New York 13, N. Y.

# Rowbottom for Cams

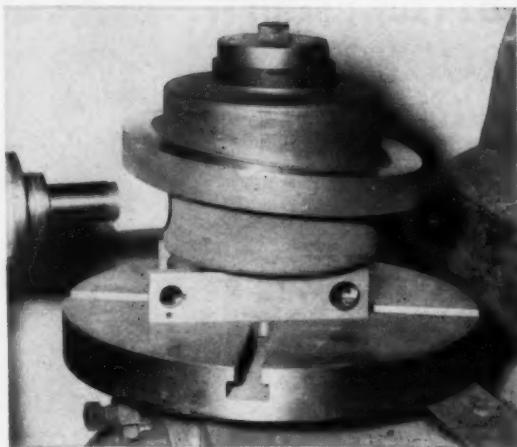
**You can't buy this experience  
BUT it's yours when you need it**

Rowbottom engineers . . . backed by complete modern cam-making facilities . . . are at your service to help you in cam design and production. Any type cam you need . . . barrel, box, side or indexing . . . in any quantity and in practically any size . . . can be produced by Rowbottom exactly to your specifications, with precision, speed and at worthwhile savings.

Back of this complete service is Rowbottom's long, exclusive experience in cam manufacture . . . an experience which is your assurance of expert technical advice and intelligent handling of your requirements whether it means producing the cams you need or furnishing the machines to make them.

You incur no obligation in asking for assistance on your requirements. Send for illustrated literature . . . consult Rowbottom . . . NOW!!

Rowbottom service includes acting as your "Cam Production Department" or in equipping your production line with Cam Millers and Cam Grinders to meet your needs.



"Male" Barrel Cam produced by Rowbottom. The cam fits between two rolls on a fixed center distance. This cam typifies "end results" of Rowbottom experience.

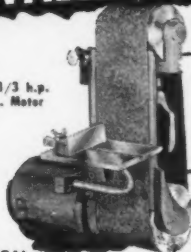
## The ROWBOTTOM MACHINE CO.

WATERBURY, CONN.

### WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

Full 1/3 h.p.  
G. E. Motor



VERTICAL

Illustrated Literature  
on Request

A few desirable distributor  
territories still available



HORIZONTAL

At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little.

complete with cord, plug,  
switch ready to use

**\$89.95**

### WALLS SALES CORPORATION

333 Nassau Avenue Brooklyn 22, N. Y.



There are no better bearings than the best for dependable service. Specify:

**B & R B  
PRECISION BEARINGS**

and be sure. Have your new catalog #20 listing many sizes available for immediate delivery!



**THE BALL & ROLLER BEARING CO.**  
DANBURY, CONN.

### Heavy Duty Bench Type

## ALLEN PUNCH PRESSES

**Powerful  
Dependable  
Economical  
Fully  
Guaranteed**

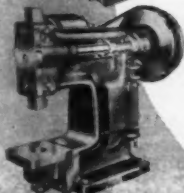
**164 Different  
Model Combinations  
1 to 5 Ton Capacities**

See your Supply Dealer or write for catalog giving complete information, specifications and prices on our line of Bench Type Punch Presses.



Model B-5  
5 Ton  
\$190.50  
less motor  
hub

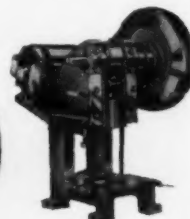
Moderate  
in price



Model LTX  
Special Duty  
1 Ton — \$80.50  
less motor — hub



Model B-2-A — 2 Ton  
Half Press — \$94.50 hub



Model B-2 — 2 Ton  
\$87.50 — less motor hub

**Thousands in use by Leading  
Manufacturing Companies**

**ALVA ALLEN INDUSTRIES**  
Dept. M Clinton, Missouri

# HIGHER PRODUCTION— LOWER COST and a BETTER PRODUCT

**AUTOMATIC CYCLE DRILL PRESS  
WITH THESE OUTSTANDING  
FEATURES**

- INFINITELY VARIABLE  
Speeds to 8000 RPM
- INFINITELY VARIABLE  
Feed range, 0" to 48" per minute
- INFINITELY VARIABLE  
Stroke to 6"
- INFINITELY VARIABLE  
Feed stroke 0" to 4 1/2"
- INFINITELY VARIABLE  
Rapid approach from 0" to 6"
- Feed in both directions easily adjustable.
- Positive stop repeats within .0005".
- Instantaneous return or delay at end of stroke.
- Multiple feeds and rapid approaches available with special feed dogs.
- Available in single or multiple spindle models.



**SECREST MACHINE CO.**  
1507 M Street, N. W. Washington 5, D. C.

## The New SCHERR MICRO-PROJECTOR

with the  
**VERTICAL design**

**NEW  
1957  
SELF CONTAINED  
IMPROVED MODEL**

**FEATURING**

- ✓ RIGID FLOOR BASE - ELIMINATING EXTRA CHARGE FOR TABLE
- ✓ TILTING STAGE FOR HELIX, ANGLES AND BEVELS
- ✓ 4" DIA. STAGE OPENING
- ✓ 14" DIAMETER SCREEN
- ✓ COLUMN SLIDE ADJUSTABLE FOR WEAR BY MEANS OF GIBS - WILL HOLD SQUARE INDEFINITELY.
- ✓ CUSTOM MADE PRECISION COATED LENSES & DOUBLE CONDENSERS FOR DIFFERENT OBJECTIVES 10 TO 100X MAGNIFICATION.
- ✓ AN ENTIRELY NEW PRACTICAL DESIGNED TOOL FOR INSPECTION DEPARTMENT AND PRODUCTION SHOP.

**BASIC PRICE  
\$ 395.00**

**WRITE FOR ILLUSTRATED FOLDER**

**GEO. SCHERR CO., Inc.**

COMPLETE LINE OF PRECISION INSTRUMENTS

200-MA LAFAYETTE STREET • NEW YORK 12, N.Y.

## Leitz OPTICAL JIG BORER

- Capacity of co-ordinate table 6" x 6"
- Setting from master glass scales in .00005"
- Setting of rotary table in 10 seconds
- Spindle head tilts for oblique holes up to 15° from vertical



Request new 8-page catalog 82-4T

**OPTO-METRIC TOOLS, INC.**  
137 M VARICK STREET, NEW YORK 13, N. Y.

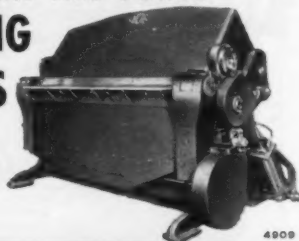
**STEEL HAND AND POWER**



## BENDING BRAKES

For Single and Quantity Runs  
Bending Steel Plate and Sheet  
Metal

Special Bending Brakes  
Double Folder Brakes



4909

**DREIS & KRUMP**  
MANUFACTURING COMPANY



7412 S. Loomis Blvd., Chicago 36, Ill.

## JIG AND FIXTURE DESIGN

A practical book with 382 pages of information on the design and construction of jigs and fixtures for drilling, boring, planing and milling. \$5 per copy. Sent on approval.

**MACHINERY, 93 Worth St., New York 13, N. Y.**

## CAMS

ALL TYPES  
MADE TO  
YOUR SPECS!



Mfrs' agents wanted



Dr. Chas. Eisler ME, Founder  
Chas. Eisler, Jr., Pres.

**EISLER ENGINEERING CO., INC.**

100 NORTH LEXINGTON  
NEW YORK, N. Y.



## EQUIP FOR THE SIZE OF THE JOB

# LEVIN<sup>®</sup> INSTRUMENT LATHES

### PRODUCE SMALL INSTRUMENT PARTS BETTER



LEVIN lathes are made in two collet capacities, 5/16" or 3/16", and thirty-three different models. Over 150 sizes of collets available in either capacity. Send for catalog "M" describing complete line of instrument lathes and accessories. **Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, California.**

For efficiency small work should be done on a small lathe. In many cases the work done on an instrument lathe requires a degree of precision and fine finish which cannot be obtained from larger machines.

## DYKEM STEEL BLUE<sup>®</sup>

**Stops Losses**  
making Dies and  
Templates



Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

**THE DYKEM COMPANY**  
2303R North 11th St. • St. Louis 6, Mo.



## CUT SCRAPER TIME

### END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

**THE DYKEM CO., 2303R NORTH 11TH ST., ST. LOUIS 6, MO.**

## DO YOU BEND? CUT?

"A MANUAL OF PROCESS for THE COLD BENDING OF METALS and ABRASIVE CUT-MACHINING OF METALS" gives practical advice on all phases of cold bending and abrasive cutting. Simply written by shop men for shop men. Price \$2.50.

**Wallace Supplies Mfg. Co.**  
1304-08 Diversey Parkway Chicago 14, Illinois

## TAP ONE MINUTE . . . DRILL THE NEXT

(singly or up to six holes at one time)

with the **NEW, Low-Cost BOICE-CRANE**  
**TAP-OR-DRILL UNIT!**

The change from tapping to drilling requires a simple "lick of a switch" and set speed changes, making the machine ready for high production drilling. Twice the tapping capacity of comparable size drill presses using tapping head attachments.

### OUTSTANDING FEATURES

- AUTOMATIC REVERSE OF TAP ROTATION
- TAPS LEAD THEMSELVES—REDUCING BREAKAGE
- TAPS RIGHT OR LEFT HAND
- SINGLE CYCLE OR CONTINUOUS CYCLE OPERATION
- CHOKE VALVE VARIES APPROACH—RETRACT SPEED
- EXTREMELY LOW AIR PRESSURE MAKES BETTER THREADS
- HIGH PRECISION, FRICTIONLESS, FOUR-WAY VALVE
- VARIABLE SEMI OR FULLY AUTOMATIC CYCLING
- REDUCES TAPPING COST FOR LARGE OR SMALL PLANTS
- SINGLE OR MULTIPLE MODELS

Capacities

(in steel)

Single Hole

Multiple Hole

Tapping

5/8"

Up to four

Up to six

Drilling

5/8"

Up to four

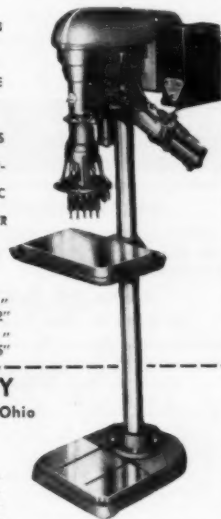
Up to six

1/4"

10/32"

1/4"

3/16"



## BOICE-CRANE COMPANY

959 West Central Avenue Toledo 6, Ohio

Please send literature and prices on Boice-Crane Tap-or-Drill unit.

NAME .....  
FIRM .....  
STREET .....  
CITY & STATE .....

# Classified and Re-Sale Section

CLASSIFIED ADVERTISING RATES: \$12 per single column inch

## Eastern Rebuilt Machine Tools

—THE SIGN OF QUALITY—

THE MARK OF DEPENDABILITY

The listing below is only a VERY SMALL AMOUNT of the total number of machine tools that we have in stock for immediate shipment. Our prices are realistic with today's market and our quality of rebuilding is the same high standard—THE LEADER IN THE FIELD OF REBUILT MACHINE TOOLS

### GEAR HOBBLING MACHINES

No. 3 Barber Colman, m.d. in base  
Type A Barber Colman, m.d.  
No. 1 Lees-Bradner Universal, m.d.  
No. 12 Barber-Colman, Double Overarm, m.d.  
No. 12 Barber-Colman, Single Overarm, m.d.  
No. 34 Brown & Sharpe, m.d. Spur & Spiral  
No. 130 Cleveland Rigdon Hobber  
No. 12H Gould & Eberhardt Universal Mfg. Gear Hobber, m.d.

### GEAR TESTERS

Type 8M Fellows Red Liner, m.d.  
FFV-60 Maag Gear Wheel Co. Profile Testing Instrument  
12" National Broach & Machine Co.  
18" National Broach & Machine Co.  
18" Gleason Bevel Gear Tester, m.d.  
No. 471 Michigan Tool Co. Hob, Reamer & Gear Checker  
National Broach & Machine Co. "Red Ring" Universal Gear Checker

### AUTOMOTIVE GRINDERS

No. 76 Van Norman Automatic Piston Turning & Grinding Machines, m.d.  
Kwik-Way Model H Piston Turning & Grinding Machine, m.d.

### CENTERLESS GRINDERS

No. 2 Cincinnati, m.d.

### CARBIDE GRINDERS

No. 48C Excello Carbide, m.d.  
No. 49 Excello H.D. Carbide Grinder, m.d.

### CRANKSHAFT GRINDERS

18x60" Landis Universal Type C, m.d., late  
22x72" Landis Type CH, m.d., late

### CYLINDER GRINDERS

No. 73 Heald Airplane Cylinder Grinder, m.d., new  
Model FG Micro Cylinder Grinder, m.d.  
No. 50 Heald, m.d., 1944

### DISC GRINDERS

No. 151 Besly, m.d.  
No. 4 Gardner Disc Grinder, m.d., new  
7 1/2 H.P. U.S. Elec. Tool Co., m.d., new  
14A Gardner, m.d.  
No. 186—36" cap. Gardner, m.d., latest  
No. 121 Hanchett Prod. Face Grinder, m.d.  
No. 124 Mattison Auto. Stroke Grinding & Polishing Machine, m.d.

### SURFACE GRINDERS

No. 16 Blanchard Rotary, m.d.  
No. 16A-2 Blanchard Auto. Rotary, m.d.  
No. 33 Abrasive, m.d.  
14" Pratt & Whitney Vertical, m.d.  
14" Pratt & Whitney Model M 1640 Vertical, m.d.  
No. A-1-8" Arter Surface Grinder  
No. 22-12" Heald Rotary, m.d.  
No. 25-A-24" Heald Rotary, m.d.  
No. 25-A-30" Heald Rotary, m.d.  
No. 2 Brown & Sharpe, m.d.  
#300-60 Hanchett Vertical Spindle, m.d.  
78" Type NT Rogers Knife Grinder, m.d.

The above is only a partial listing  
WRITE FOR COMPLETE STOCK LISTING

## THE EASTERN MACHINERY COMPANY

1006 Tennessee Avenue, Cincinnati 29, Ohio • MEIrose 1-1241 • Cable Address EMCO

### NEED REPRESENTATION?

Agent—seeking a line requiring Engineering and involved problems, over 10 years experience, Chicago Area.

Box No. 712, Machinery,  
93 Worth St., New York 13, N.Y.

### Used by U.S. Armed Forces

MACHINE TOOL RECONDITIONING & the Art of Hand Scraping (3rd printing)—the practical point of view—Write for free folder describing illustrated book.

Machine Tool Publications  
215 Commerce Bldg. South Wabash St.  
St. Paul 1, Minn.

### ARE YOU READING YOUR OWN COPY OF

### MACHINERY

If not see our offer on last page of yellow section beginning on page 221.

### THREAD GRINDER

T G 636 J & L Serial 110793 Excellent Condition—Relieving Attachment—Abundance of Tooling and Accessories—Two Wheel Dresser Heads—Universal and Pantograph. Price: \$15,000.00.

### BRAUN GEAR COMPANY

239 Richmond Street Brooklyn 8, New York

### TOOLS OF QUALITY

1 1/2" No. 61 New Britain automatic checker  
1 1/2" 50 spindle Warner & Swasey, late  
100 ton No. 25 Williams, White Balldoor, late, high grade  
10 ton 54" stroke American Duplex vertical hydraulic surface broach  
6" capacity Campbell Model 401 abrasive cut-off  
Model 420 W.F. & John Barrow horizontal deep hole drill or boring machine  
24 spindle No. 2 Bausch multiple drill, motor drive  
24" swing 3 spindle Allen No. 3 production drill, power feed  
15" 3 spindle Aveyatt No. 2, with Aveyatt power feed  
12" No. 1 LMS Leinard Gifford single spindle, late  
4 spindle 24" Cincinnati Bickford box column direct drive, motor drive upright drill  
Model 8LV Davis & Thompson Rotomatic vertical drill, now with 8 spindle head  
Model BL 2416 three spindle Pratt & Whitney Keller duplicator or engraver  
Wiesco continuous oil groovers, new 1953, MD  
No. 7 Model 7125A Fellows universal gear shaper  
4" x 12" Model H Landis plain hydraulic cylindrical grinder  
10" x 18" Norton type C semi-automatic hydraulic plain cylindrical grinder  
10" x 36" Landis type DC plain cylindrical grinder  
14" x 14" Model 112 Hiett university cylindrical grinder  
20" x 72" Landis type D heavy duty plain hydraulic cylindrical grinder  
No. 74 Heald hydraulic plain internal grinder, cross sliding headstock  
No. 24-36 Bryant hole grinder  
Reinecker vertical spindle precision grinder, internal, external and some surface grinding 100 lb. Morse sight power hammer

WRITE FOR YOUR STOCK LIST NO. 207.

### MILES MACHINERY CO.

PHONE SAGINAW PL 2-3105

2045 E. GENESEE AVE. SAGINAW, MICH.

### BUSINESS OPPORTUNITIES

METAL PROD. MFG CO. S.E. Tex. (Utility tables, barbecue bars, shelving, laundry tubs, etc.—all modern design; most in decorator's colors!) A-1 loc. 13,000 sq. ft. Keptal wrk. cond. & functional eqpt. Nets \$26,000! Last yr. vol: 1/4 Million! Write for brochure! Ref. B.9107

MACHINE SHOP—SW Tenn. Net \$30,000. No comp. A-1 steel bldg & eqpt. 2 mils \$180 mo. Unlim pot. Ask \$99,275. Terms open. Det on req. Ref 39428

ELECTRIC SHOP—NW Calif. Estab 47. Net \$12,000. Motor re-wind, elec contr. RE Opt. Full eqpt. Ask \$24,500. Det on req. Ref. 8 24545

SCRAP IRON & METAL—L.I., N.Y. Price \$275,000 incl. eqpt. & mach. Gross Sales \$500,000-net profit \$100,000 yr. Decls on req. Ref. B-42725

PRECISION MACHINE SHOP—SW Conn. Estab client, wrld's lgst. indus. plants. Enviabl rep. First class precision mach-tools val. exccs ask. pre. \$100,000. Write B42820

3 WHOLESALE ELECTRONIC STORES—Within 100 mile radius—3 states mid. east. Heart of indus. empire. Pot. untouch. Complete sales, c're, del. eqpt. Lo overhead, big profit. Gross sales \$570,000. Ask \$500,000. Brochure on req. Ref. B 62296.

PRECISION SCREW MANUFACTURING—NE Ohio. Swiss type. A-1 eqpt. Estab '42. Lge indus. city. Net \$20,500. \$15,000 down, bal 12 mos. Write B62360

### BUSINESS MART OF AMERICA

5723 Melrose Ave., L.A. 38, Calif.

### MACHINE TOOLS

No. 56-90 Cincinnati Duplex Hydromatic Mill, 1942.  
3' x 11" 3' x 13" Cincinnati Bickford Super Service Radial Drill.  
No. 3, No. 3 CINCINNATI H.S. D.T. Herz, Mill, New 1945. Extra table travel, vert. heads.  
FALK MACHINERY CO.  
19 Ward Street—BA 5-5887—Rochester, N. Y.



## GEARS

Made to Your  
Specifications

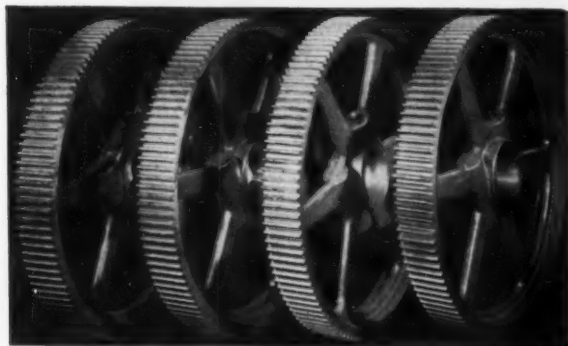
You and we can form a team—you to draw up the specifications; we to make the gears—that will be profitable to both of us. Gears of all types, all sizes, all materials. Design-engineering service available.

Custom Gears  
Exclusively

**DIEFENDORF GEAR  
CORPORATION**

Syracuse 1, N. Y.

**DIEFENDORF**  
GEARS



### Cast Iron CLAMP HUB GEARS

Each of these cast iron clamp hub gears for paper mill use weighs 1300 pounds—accurately machined to give long, trouble-free service. Stahl has the experience, skill and production facilities to more than satisfy your most exacting gear needs—any size, any quantity, any material. Send for Stahl's estimate first!

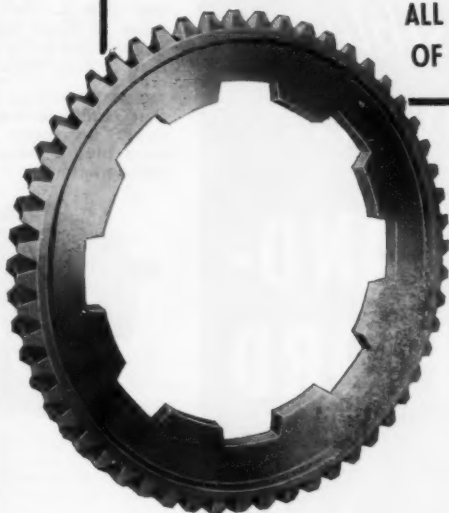
**Stahl**

**GEAR & MACHINE COMPANY**  
3901 Hamilton Ave. Cleveland 14, Ohio

SPURS TO 72" PD, 1 DP  
BEVELS TO 54" PD, 1 DP  
SPIRAL, HELICAL and WORM GEARS  
TO 48" PD, 2 DP  
CONTINUOUS-TOOTH HERRINGBONE  
TO 60" PD, 2 DP  
SPROCKETS TO 72" PD, 2½" CP  
RACKS TO 20 FT. LONG, 3 DP  
SILENT GEARS:  
RAWHIDE, BAKELITE, FIBROIL  
HEAT-TREATED, CASE OR FLAME-  
HARDENED GEARS—  
OF CARBON OR ALLOY STEEL

FOR WORMS  
AND  
WORM GEARS  
**BILGRAM**  
IS  
THE ANSWER!

ALL TYPES  
OF GEARS



If you need worms and worm gears, come to BILGRAM. With over 70 years' experience, specially designed equipment and a fully modern plant, we can supply you with gears that meet your exact specifications for accuracy, performance and quality.

We are equipped to fill all your gear needs: Bevel Gears with straight or spiral cut teeth . . . Ellipticals . . . Herringbones . . . Helicals . . . Racks . . . Spurs . . . Hypoids . . . as well as Worms. Get BILGRAM estimate on your next gear needs.



FOR ALL TYPES OF  
GEARS CALL  
**BILGRAM**  
GEAR & MACHINE WORKS

Manufacturers of Bevel Gear Generators  
and Chamfering Machines

1217-35 SPRING GARDEN ST.  
PHILADELPHIA 23, PA.

*Designed  
to do  
one job  
in the best  
possible  
way.....*

**LELAND-  
GIFFORD**

*Special*

**DRILLING  
MACHINES**

Contact the office nearest you for help  
with your drilling problems.

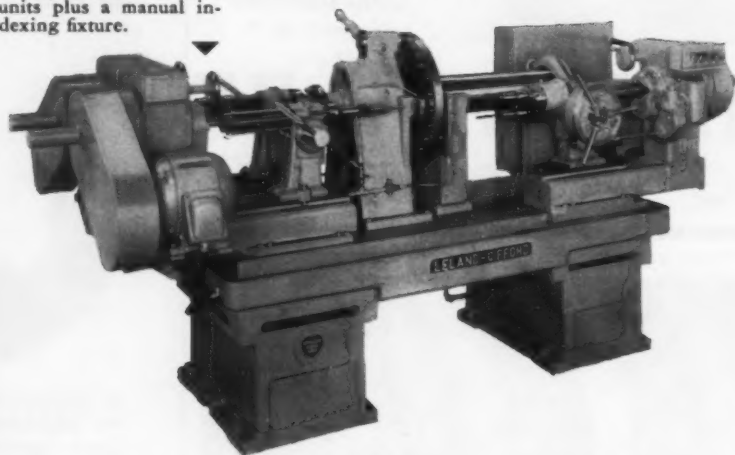
**THE JOB** — Drill two  
.630 x 3 3/4" x 25° holes  
in 4-cylinder and 6-  
cylinder crankcases.

**THE SETUP** — A No. 3  
self-contained step feed  
unit with 2-spindle head,  
special base cabinet with  
roller-type fixture, plus  
angular top column. Ties  
into conveyor line to  
eliminate lifting.



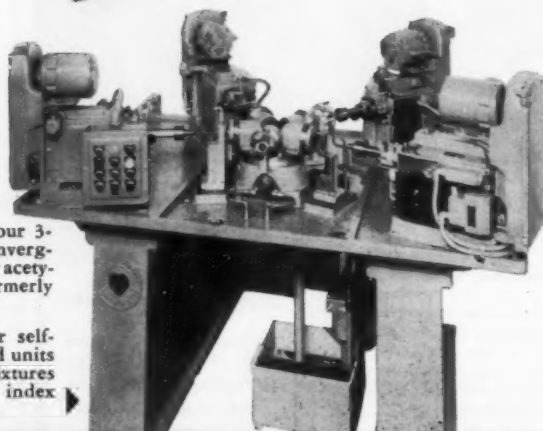
**THE JOB** — Drill and  
ream 48 holes (tap and  
countersink 24) in an air-  
craft turbine shaft.

**THE SETUP** — Two single  
(left) and one 2-spindle  
(right) horizontal V-belt  
units plus a manual in-  
dexing fixture.



**THE JOB** — Drill four 3-  
diameter deep converg-  
ing holes in copper acety-  
lene torch tips. Formerly  
a hand operation.

**THE SETUP** — Four self-  
contained step feed units  
plus five holding fixtures  
and a hydraulic index  
table.



**LELAND-GIFFORD**  
*Drilling Machines*

WORCESTER 1, MASSACHUSETTS, U.S.A.

**CHICAGO 45**  
2315 West Peterson Ave.  
**DETROIT**  
10429 West McNichols Rd.  
**CLEVELAND 22**  
P.O. Box 853

**INDIANAPOLIS 6**, P. O. Box 1051  
**ROCHESTER 12**, P. O. Box 24, Charlotte Station

**NEW YORK OFFICE**  
75 South Orange Ave.  
South Orange, N. J.  
**LOS ANGELES OFFICE**  
2620 Leonis Blvd.  
Vernon 58, Cal.



# ALPHABETICAL LIST OF ADVERTISERS

|  |  |  |  |   |
|--|--|--|--|---|
| <b>A</b>   |  | Chicago Pneumatic Tool Co. .... 114-115                  | Eisler Engineering Co., Inc. 364               | Horsburgh & Scott Co. .... 324                          |
| Ace Drill Corp. .... 334   | Cincinnati Bickford Div., Giddings & Lewis Machine Tool Co. .... 46-47       | Elox Corporation of Michigan ..... 279                   | Errington Mechanical Laboratory, Inc. .... 344 | Hunt, C. B. & Son, Inc. .... 352                        |
| Acme Machinery Div., Hill Acme Co. .... 122                                  | Cincinnati Gear Co. .... 358   |  |  | <b>I</b>  |
| Ajax Manufacturing Co. .... 132  | Cincinnati Grinders Inc. .... 14-15  |  |  | Ingersoll Milling Machine Co. .... 274                  |
| Allegheny Ludlum Steel Corp. .... 100  | Cincinnati Lathe & Tool Co. 261  |  |  |   |
| Allen, Alva, Industries .... 363   | Cincinnati Milling Machine Co. .... 6-7                                      |  |  | <b>J</b>  |
| Allen-Bradley Co. .... Insert 91-92  | Cincinnati Milling Products Div., Cincinnati Milling Machine Co. .... 25, 35 | <b>F</b>   |  | Jacobs Manufacturing Co. .... 45                        |
| Allis-Chalmers Manufacturing Co. .... 40                                     | Cincinnati Shaper Co. .... 227   | Fairfield Manufacturing Co. 336                          |  | Jones & Lamson Machine Co. .... 211, 213, 215, 217, 219 |
| Alpha Press & Machine, Inc. 350  | Circular Tool Co., Inc. .... 297   | Farval Corp. .... 117                                    |  |   |
| American Brass Co. .... 293  | Cities Service Oil Co. .... 52   | Fawick Airflex Div., Fawick Corp. .... 275               |  | <b>K</b>  |
| American Broach & Mch. Co. .... Insert 71-88                                 | Classified Advt. .... 366  | Federal Press Co. .... 230                               |  | Kennametal, Inc. .... 317                               |
| American Chain & Cable Co., Inc., Wilson Mechanical Instrument Div. .... 328 | Clausing Div., Atlas Press Co. .... 270                                      | Federal Products Corp. .... 48-49                        |  | Kingsbury Machine Tool Corp. .... 277                   |
| American Tool Works Co. .... 123   | Clearing Machine Corp., Div. U. S. Industries Inc. .... Back Cover           | Fellows Gear Shaper Co. .... 4-5                         |  |   |
| Ames, B. C. Co. .... 322   | Cleveland Automatic Machine Co. .... 243                                     | Ferracute Machine Co. .... 356                           |  |   |
| Armstrong-Blum Mfg. Co. .... 24  | Cleveland Crane & Engrg. Co. .... 130  | Foote-Burt Company .... 116                              |  |   |
| Armstrong Bros. Tool Co. .... 34   | Cleveland Twist Drill Co. .... Insert 89                                     | Fosdick Machine Tool Co. 50-51                           |  | <b>L</b>  |
| Atlas Press Co., Clausing Div. .... 270                                      | Columbus Die-Tool & Mch. 288   |  |  | L & J Press Corp. .... 348                              |
| Austin Industrial Corp. .... 289   | Commercial Filters Corp. .... 260  |  |  | Lake Erie Engineering Corp. 327                         |
| Avey Div., The Motch & Merryweather Co. .... 120-121                         | Cone Automatic Mch. Co., Inc. .... 125                                       | <b>G</b>   |  | Laminated Shim Co., Inc. .... 292                       |
| Axelson Manufacturing Co. Div. U. S. Industries, Inc. .... 56-57             | Cone Automatic Machine Co., Inc., Pilot Div. .... 333                        | Gallmeyer & Livingston Co. 245                           |  | Landis Machine Co. .... 2-3                             |
|  | Consolidated Mch. Tool Div. Farrel-Birmingham Co., Inc. .... 305             | Gardner Machine Co. .... 21, 41                          |  | Landis Tool Co. .... 10-11                              |
|  |  | Gear Grinding Machine Co. .. 335                         |  | Lapmaster Div., Crane Packing Co. .... 276              |
| <b>B</b>   |  | Gear Specialties, Inc. .... 253                          |  | LaSalle Tool, Inc. .... 357                             |
| Babcock & Wilcox Co. .... 101  |  | Giddings & Lewis Machine Tool Co. .... 18-19             |  | LeBlond, R. K., Machine Tool Co. .... 60-61             |
| Baird Machine Co. .... Inside Back Cover                                     |  | Gisholt Machine Co. .... 112-113                         |  | Leland-Gifford Co. .... 368                             |
| Baldwin-Lima-Hamilton Corp., Hamilton Div. .... 269                          |  | Gleason Works .... 119                                   |  | Lepel High Frequency Laboratories, Inc. .... 288        |
| Ball & Roller Bearing Co. .... 363   |  | Gorton, George, Machine Co. 280                          |  | Levin, Louis & Son, Inc. .... 365                       |
| Barber-Colman Co. Insert 71-88   |  | Goss & DeLeeuw Mch. Co. .. 330                           |  | Lincoln Electric Co. .... 220                           |
| Bardons & Oliver, Inc. .... 325  |  | Gray, G. A., Co. .... 22-23                              |  | Linde Co., Div. Union Carbide Corp. .... 70             |
| Barnes Drill Co., Inc. Insert 71-88  |  | Graymills Corp. .... 300                                 |  | Lodge & Shipley Co., The .... 337                       |
| Barnes, W. F., John Co. .... Insert 71-88                                    |  | Greenlee Bros. & Co. Insert 71-88                        |  | Logansport Machine Co., Inc. .... 361                   |
|  | <b>D</b>   | Grotnes Machine Works, Inc. .... 298                     |  | Lowe Brothers Co. .... 299                              |
| Bethlehem Steel Co. .... 95, 107   | Danly Machine Specialties, Inc. .... 129                                     |  |  | Lufkin Rule Co. .... 316                                |
| Bilgram Gear & Mch. Works 367  | Davis Keyseater Co. .... 361   | <b>H</b>   |  |   |
| Blanchard Machine Co. .... 90  | Delta Power Tool Div., Rockwell Mfg. Co. .... 353                            | Hamco Machines, Inc. .... 362                            |  | <b>M</b>  |
| Bliss, E. W. Co. .... 259  | Denison Engineering Div., American Brake Shoe Co. 64                         | Hamilton Div., Baldwin-Lima-Hamilton Corp. .... 269      |  | Madison-Kipp Corp. .... 108                             |
| Boice-Crane Co. .... 365   | De Vlieg Machine Co. .... 262-263  | Hamilton Tool Co. .... 351                               |  | Materials Section .... 93-108                           |
| Brown & Sharpe Mfg. Co. .... 209   | Diefendorf Gear Corp. .... 367   | Hanchett Magna-Lock Corp. 340                            |  | Mattison Machine Works Insert 71-88                     |
| Bryant Chucking Grinder Co. .... 290-291                                     | Dow Chemical Co. .... 104  | Hannifin Corp. .... 65                                   |  | M. B. I. Export & Import, Ltd. .... 118                 |
| Buck Tool Co. .... 328   | Dreis & Krump Mfg. Co. .... 364  | Hanson-Whitney Co. .... 354                              |  | Metal Carbides Corp. .... 361                           |
| Buffalo Forge Co. .... 124   | Dykem Co. .... 365   | Hardinge Brothers, Inc. .... 138                         |  | Micromatic Hone Corp. .. 308-309                        |
| Buhr Machine Co. .... Insert bet. 116-117                                    | Dynamatic Div., Eaton Mfg. Co. .... 267                                      | Haynes Stellite Div., Union Carbide Corp. .... 105       |  | Minster Machine Co. .... 264-265                        |
| Bullard Co. .... Insert 69   |  | Heald Machine Co., The Inside Front Cover                |  | Mitts & Merrill .... 346                                |
|  | <b>E</b>   | Heller Tool Co. .... 58-59, 281                          |  | Modern Machine Tool Co. .. 304                          |
| Carlton Machine Tool Co. .... 283  | Eaton Mfg. Co., Dynamatic Div. .... 267                                      | Hendey Machine Div., Barber-Colman Co. .... Insert 71-88 |  | Moline Tool Co. .... 312                                |
| Carpenter Steel Co. .... 98  |  | Hill Acme Co. .... 122                                   |  | Monarch Machine Tool Co. .... 126-127                   |
| Chicago-Latrobe .... 310   |  | Holcroft & Co. .... 314                                  |  | Moore Special Tool, Inc. .... 329                       |

**GEARS — ALL MAKES . . .**  
**Special and standard**  
 PRECISION GEARS UP TO 200 DIAMETRAL PITCH  
*All Gears certified for Accuracy*  
*Quality and Fine Workmanship*  
**NEW JERSEY GEAR & MFG. CO.**  
 1470 Chestnut Ave. Hillside, N. J.






**IMPROVE FACING OPERATIONS**  
 ON BORING MILLS - DRILLS - LATHES  
 MILLERS AND RADIALS

M-D facing Head feeds automatically. Lathe tool bit travels radially from center outward or reverse. 10 sizes, 6" to 46" dia. Write for bulletin, prices.

**MUMMERT-DIXON CO.** 126 Philadelphia St. HANOVER, PA.

## ALPHABETICAL LIST OF ADVERTISERS

|   |          |   |  |  |
|---|----------|---|--|--|
| <b>N</b>  |          | Parker-Kalon Div., General American Transportation Corp. .... 268 | Simonds Saw & Steel Co. .... 331                         | United States Drill Head Co. 339   |
| National Acme Co. .... 30-31  |          | Philadelphia Gear Works, Inc. .... 134                            | Sinclair Refining Co. .... 349                           | United States Steel Corp. 97, 99   |
| National Automatic Tool Co. Inc. .... 110-111, 135                                      |          | Potter & Johnston Co. .... 285                                    | Snyder Tool & Engrg. Co. 42-43                           | Universal Engineering Co. 271, 318   |
| National Broach & Mch. Co. 109  |          | Pratt & Whitney Co., Inc. 286-287                                 | South Bend Lathe Works .... 278                          | Used Machinery .... 366  |
| National Tube Div., United States Steel Corp. .... 97                                   |          | Producto Machine Co. .... 55                                      | Stahl Gear & Machine Co. .... 367                        |  |
| Nebel Machine Tool Corp. .... 266   |          |   | Standard Electrical Tool Co. 319                         | <b>V</b>   |
| New Britain Machine Co., New Britain-Gridley Machine Div. .... 32-33, Insert bet. 32-33 | <b>R</b> |   | Standard Oil Co. (Indiana) 36-37                         |  |
| New Departure, Div. .... 106  |          | Reed Rolled Thread Die Co. 338                                    | Standard Pressed Steel Co. 62-63, 68                     | Van Norman Machine Co. .. 8-9  |
| New Jersey Gear & Mfg. Co. 369  |          | Rockford Machine Tool Co. Insert 71-88                            | Starrett, L. S. Co. .... 232                             | Vascoloy-Ramet Corp. .... 257  |
| Niagara Machine & Tool Works .... 66-67   |          | Rollway Bearing Co., Inc. .... 343                                | Stuart, D. A., Oil Co., Ltd. 26-27                       | Verson Allsteel Press Co. .... 347   |
| Nice Ball Bearing Co. .... 321  |          | Rowbottom Machine Co. .... 363                                    | Sun Oil Co. .... 239                                     | Vickers, Inc., Div. Sperry Rand Corp. .... 303                               |
| Nilson, A. H., Machine Co. 320  |          | Russell, Holbrook & Henderson, Inc. .... 131                      | Sundstrand Machine Tool Co. .... Insert 71-88            | Viking Pump Co. .... 342   |
| Norma-Hoffmann Bearings Corp. .... 313  |          | Ruthman Machinery Co. .... 360                                    |  | Virginia Gear & Machine Corp. .... 134                                       |
| Norton Company .... 38-39, Insert bet. 64-65  |          | Ryerson, Joseph T. & Son, Inc. .... 140                           | <b>T</b>   |  |
|   | <b>S</b> |   |  | <b>W</b>   |
| <b>O</b>  |          | Saginaw Steering Gear Div., General Motors Corp. .... 255         | Tannewitz Works .... 359                                 | Wagner Bros., Inc. .... 295  |
| Oakite Products, Inc. .... 102  |          | Scherr, George, Co., Inc. .... 364                                | Texas Company .... 136                                   | Waldes Kohinoor, Inc. .... 345   |
| Oilgear Co. .... 273  |          | Scott Paper Co. .... 307  | Thompson Products, Inc. .... 128                         | Wales Strippit Co. .... 249  |
| Olofsson Corp. .... 225   |          | Secrest Machine Co. .... 364                                      | Thor Power Tool Co. .... 323                             | Walker, O. S., Co., Inc. .... 355  |
| Opto-Metric Tools, Inc. .... 364  |          | Seneca Falls Mch. Co. .... 133                                    | Timken Roller Bearing Co. Front Cover                    | Wallace Supplies Mfg. Co. .. 365   |
| Orban, Kurt Co., Inc. .... 241  |          | Sheffield Corp. .... 272  | Timken Roller Bearing Co. Steel & Tube Div. .... 93      | Walls Sales Corp. .... 363   |
| Osborn Mfg. Co. .... 20   |          | Sheldon Machine Co., Inc. .. 306                                  | Tomkins-Johnson Co. .... 53                              | Warner & Swasey Co. .... 28-29   |
|   | <b>P</b> | Shell Oil Co. .... 301  | Townsend, H. P. Manufacturing Co. .... 296               | Wheelock, Lovejoy & Co., Inc. .... 332                                       |
| Pangborn Corporation .... 370   |          | Simonds Abrasive Co. .... 311                                     |  | Williams, J. H. & Co. .... 341   |
|   |          |   | <b>U</b>   | Wilson, K. R., Inc. .... 294   |
|   |          |   |  | Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc. .... 328 |
|   |          |   | U. S. Tool Company, Inc. .. 12-13                        | <b>Y</b>   |
|   |          |   | Union Carbide Corp., Haynes Stellite Co. .... 105        |  |
|   |          |   | Union Carbide Corp., Linde Air Products Co. Div. .... 70 | Yoder Co. .... 44  |

Whatever Pangborn  Blast  Cleaning  Machine best fills your needs . . .

# Pangborn Rotoblast Cleaning action gives you lowest cost per ton of castings cleaned

For complete information on blast cleaning, write for Bulletin 1210 to  
**Pangborn Corporation**  
1200 Pangborn Blvd., Hagerstown, Md.

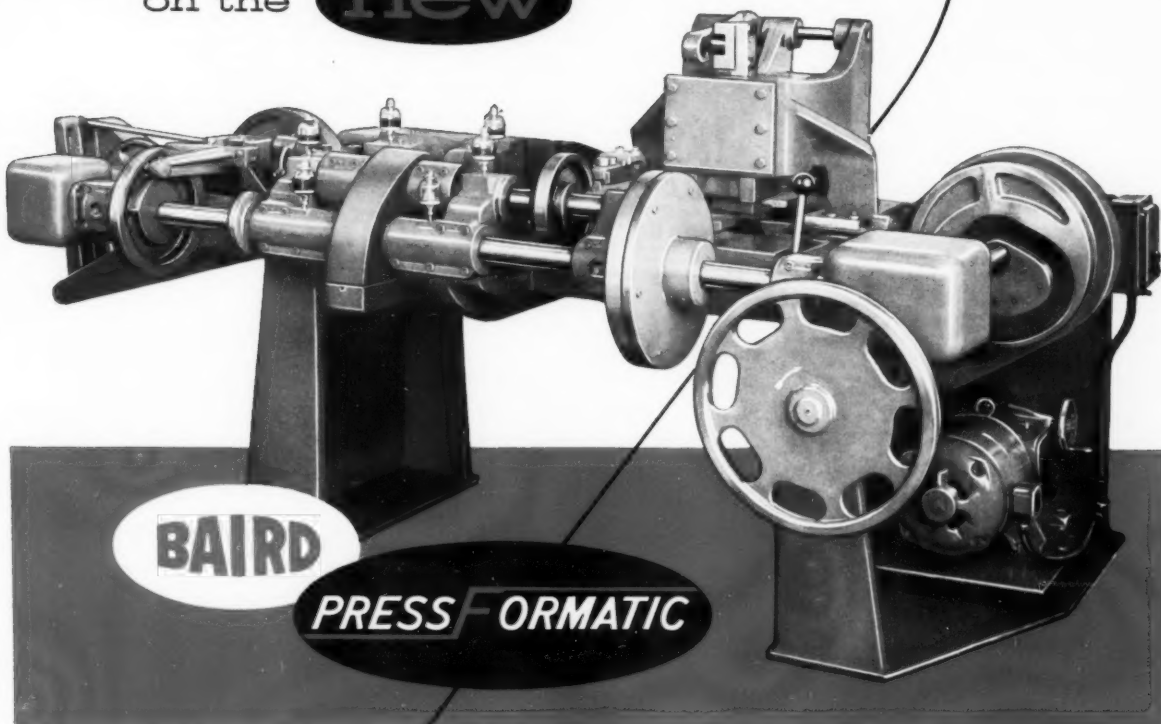
Manufacturers of Blast Cleaning and Dust Control Equipment

## Pangborn

### BLAST CLEANS CHEAPER

BARRELS • CONTINUOUS-FLO® BARRELS • TABLES • TURN-STYLE TABLES • ROOMS • TABLE-ROOMS • CABINETS • SPECIAL MACHINES

press stampings? wire and ribbon formed parts?  
 produce both ... more economically...  
 on the **new**



let's get together  
 and explore  
 the possibilities

In this progressive development, the practically unlimited wire and ribbon metal forming abilities of the Baird 4-slide have been combined with a horizontal automatic press of advanced design. The result is an automatic production unit of still greater **VERSATILITY**, permitting an extremely wide range of stamping and forming operations.

Here are just a few of the outstanding special features to be found in the new Baird **PRESSFORMATIC**:

- Direct-action horizontal automatic press of 20 or 40-ton capacity.
- Exclusive "2-to-1" feed, allowing maximum time for forming.
- 270° forming cycle, permitting relatively easy cam motion for high production speed.
- Two vertical motions.
- Capacity to 3"-wide stock.

Send us prints or parts for production study or, for additional information and comprehensive brochure, write Dept. M.

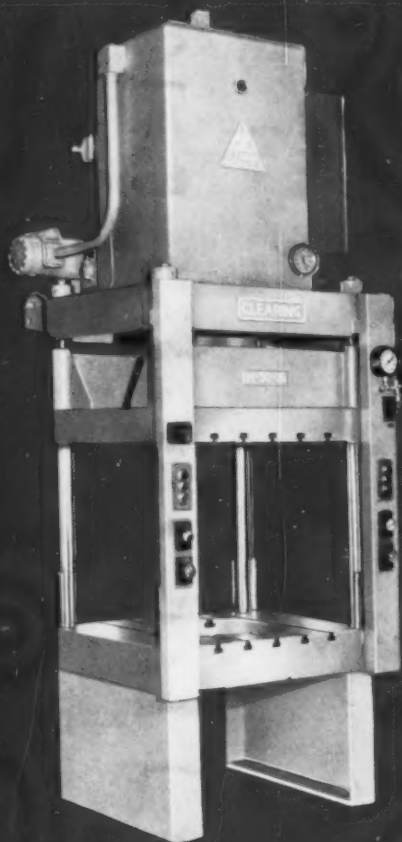


4BA57

**THE BAIRD MACHINE COMPANY • STRATFORD, CONN.**

*Ask Baird about these other major aids to high production at low cost.*

Six and Eight-Spindle Chucks • Automatic Multiple Transfer Presses • Automatic 12-Station Duplex Turning Machines • Vertical Continuous Lathes • Automatic Four-Slide Machines • Pressformatic Ribbon Metal Forming Machines • Barrel Finishing Machinery • Machinery for Chain and Roller Chain Production, Garment Hook and Eye Production • Precision Bench Presses



Hydraulic presses are available with a simple hydraulic control or with complete electrical controls as illustrated. T-slotted beds and slides are standard.



All steel welded frames are designed to give easy access for feeding and scrap removal. The mechanical press shown here is equipped with built-in electrical controls.

## Give Costs a *TRIMMING* with NEW CLEARING FLASH TRIMMING PRESSES

Generous bed sizes, ample clearances for feeding and unloading, low initial costs, high speeds—these are the features you'll find in Clearing trimming presses. These presses are available in gap-type mechanical models and in column and gap-type hydraulic models. Capacities range from 30 to 75 tons.

Clearing trimming presses are readily portable by lift truck or crane. When controls are specified, they are built right into the press so that moving the machine from one place to another is greatly simplified. Controls available on these machines

may be as simple or as elaborate as you wish. Machines will be furnished without accessories or with deluxe controls which can include "electric eye" safety devices that stop the press if the beam is interfered with.

If you have been tying up standard punch presses for trimming work, it will pay you to investigate the advantages of presses which are specifically designed to simplify and speed up your flash trimming operations. Write or call on Clearing for more detailed information.

### **CLEARING PRESSES**

THE WAY TO EFFICIENT MASS PRODUCTION

**CLEARING MACHINE CORPORATION** division of U. S. INDUSTRIES, INC.

6499 W. 65th STREET, CHICAGO 38, ILLINOIS • HAMILTON DIVISION, HAMILTON, OHIO

